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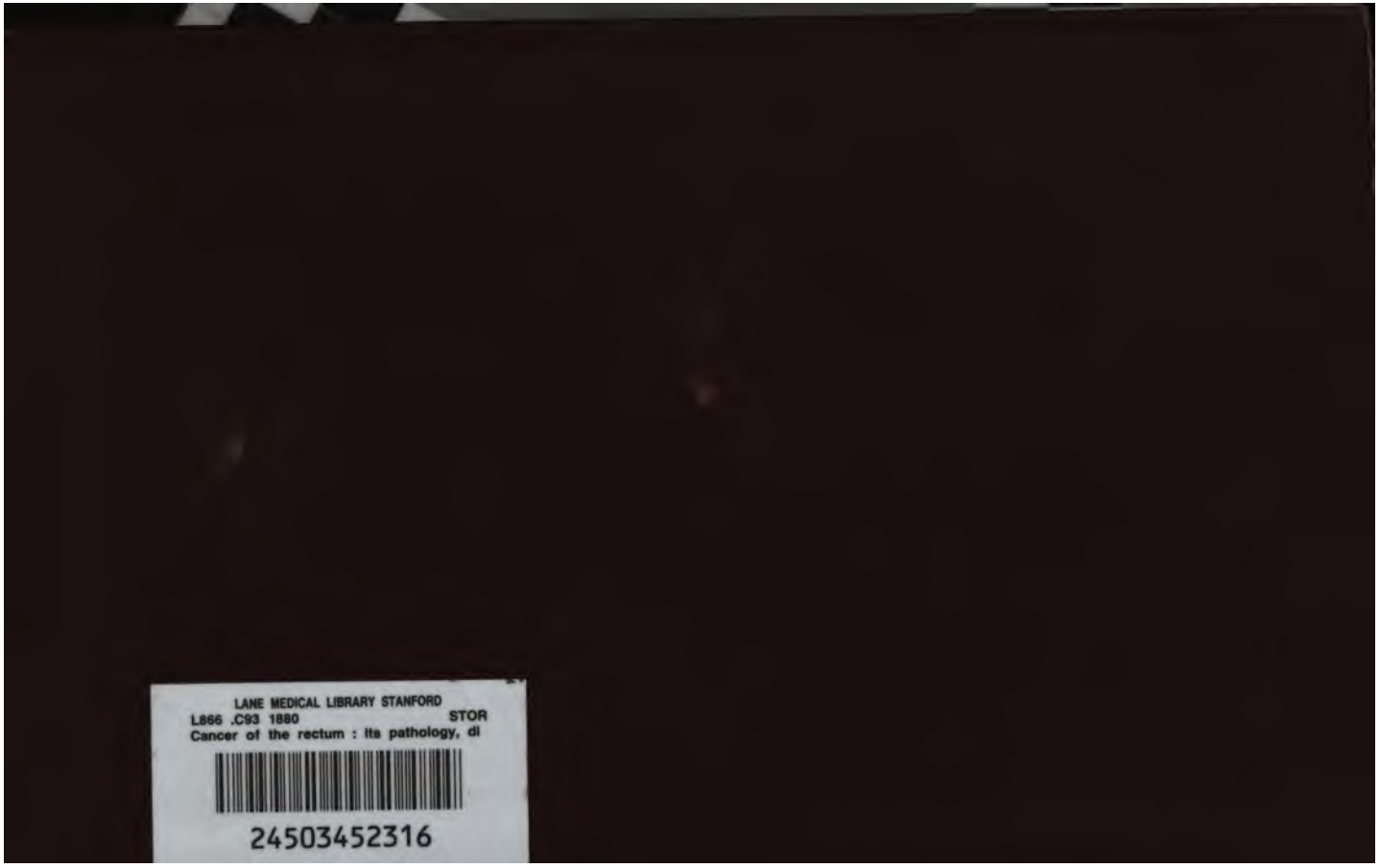
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CANCER OF THE RECTUM

ITS

PATHOLOGY, DIAGNOSIS, AND TREATMENT

INCLUDING A PORTION OF

THE JACKSONIAN PRIZE ESSAY FOR 1876

BY

W. HARRISON CRIPPS, F.R.C.S.

SURGEON TO THE GREAT NORTHERN HOSPITAL; SURGICAL REGISTRAR, ST. BARTHOLOMEW'S HOSPITAL; LATE ASSISTANT DEMONSTRATOR OF ANATOMY, ST. BARTHOLOMEW'S HOSPITAL.

LONDON

J. & A. CHURCHILL, NEW BURLINGTON STREET

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PREFACE

THE Council of the Royal College of Surgeons confined the subject for the Jacksonian Prize Essay in 1876 exclusively to the treatment of rectal cancer. Since writing the Essay I have devoted much time to the study of the minute anatomy of malignant rectal disease, and have also had frequent opportunities of increasing my knowledge of the diagnosis and treatment of the disorder. In this work, therefore, the scope of the original Essay has been considerably enlarged.

I take this opportunity of stating how much I am indebted to the kindness of Sir James Paget, Mr Gay, Mr Doran, and other friends for the opportunities they have afforded me of examining various specimens of the disease.

W. HARRISON CRIPPS.

6, STRATFORD PLACE, W.;
October, 1879.

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CANCER OF THE RECTUM

CHAPTER I

INTRODUCTION

THERE is no reason for supposing that cancer when situated in the rectum differs essentially in its nature from the same disease in other parts of the body. It may be well, therefore, to take a brief glance at the general nature of the disease.

So much ambiguity has arisen as to the meaning of the word cancer that it may be well to define the sense in which the term is used in this essay. The modern school of pathologists limit the term to express a group of tumours presenting certain definite structures under the microscope. In this group are included scirrhous, medullary, colloid, and epithelial growths, but the various forms of sarcoma are excluded. The older surgeons, on the other hand, con-

sider the expression cancer as synonymous with the term malignant. It therefore included all varieties of growth that have a tendency to recur after removal, to infect neighbouring glands, or to become generally disseminated about the body. When the Council of the College of Surgeons set the subject for the Jacksonian Prize Essay for 1875, on "Cancer of the Rectum considered with the possibility of Cure by Extirpation," it was in the latter sense that the term was used. I shall, therefore, in the subsequent pages, use the word cancer as equivalent to malignant growth.

The death rate from cancer has shown a pretty steady relative increase during the whole period of which we have accurate returns. The following table, compiled from the Registrar-General's Reports, shows the proportion of deaths from this disease, compared with those from other causes, during each of the twenty-six years from 1851 to 1876.

Table.

—	...	1860, 1 in 60	...	1870, 1 in 52
1851, 1 in 73	...	1861 „ 58	...	1871 „ 52
1852 „ 72	...	1862 „ 58	...	1872 „ 48
1853 „ 72	...	1863 „ 62	...	1873 „ 46
1854 „ 73	...	1864 „ 60	...	1874 „ 47

1855, 1 in 69	...	1865, 1 in 60	...	1875, 1 in 47
1856 „ 64	...	1866 „ 59	...	1876 „ 44
1857 „ 69	...	1867 „ 54	...	—
1858 „ 68	...	1868 „ 53	...	—
1859 „ 64	...	1869 „ 52	...	—

Or if we compare the death rate with the number of persons living it will be found that whereas in the ten years 1851 to 1860 it averaged annually one death from cancer in every 3150 persons living, in the next ten years, 1861 to 1871, the proportion had increased to one in 2570. The mortality from the disease varies widely in the different districts of England. Nor is it only in different parts of the country that this variation is marked, for even in the subdivisions of the metropolitan districts there is a wide divergence in the rate of cancer mortality. Whereas in Marylebone, St George's, Hanover Square, and West London, the rate is 80 in 100,000, it is less than half this in St Luke's, Bethnal Green, and Rotherhithe. In forming these tables deaths amongst women have alone been included.

Cancer is not only more than twice as frequent amongst females as it is with males, but the occupation of men in the London districts often takes them away from their homes for at

least half the twenty-four hours, and would thus bring them under different influences from those to which they would be subject at home; while, on the other hand, women generally pass the greater portion of their day in the same locality.

Modern surgeons differ materially in their views as to the origin of cancer. The widest divergence in opinion lies between those who consider that the origin of the disease is to be sought in purely local causes and those who deem that it is rather to be found in some deep-seated condition of the constitution. Those who consider that the constitution is in fault believe that there is a condition of the body generally, which renders it liable to burst into cancer with some slight accidental irritation, or even without any apparent irritation at all. In fact, they consider that there is a predisposition or liability to the disease, found only in a certain proportion of human beings, and the tumour is looked upon as merely the expression of a previous morbid condition of the body in general, analogous to the sudden outbreak of inflammation in the joint of a gouty person, or the development of bony growths about the joints of a rheumatic sufferer. Dr Payne

expresses the meaning of constitution, as regards cancer, as a "lesion or change in which the general disposition of the body has a very large share, and the influence of external causes—injury, irritation, and so on, has a comparatively small share." As opposed to these views, those who think that the disease is purely local in its origin contend that the tumour is due to some cause that acts locally on a particular part, and that this is the starting-point of the cancer, there being no previous disposition of the body to the disease, but that it only becomes secondarily affected from this original centre.

Many facts and arguments have been brought forward to support either view of the origin of the disease. In favour of the constitutional origin are, firstly, the hereditary nature of cancer; secondly, its almost inevitable return after removal; thirdly, its production in certain persons as the result of an injury.

The transmission of cancer by inheritance, or the particular condition of body liable to be attacked by the disease, has been taught from the earliest times, and is, perhaps, the strongest argument in favour of the constitutional view. Indeed, it cannot be regarded as other than

certain proof that a tendency, at least, to the disease has been directly transmitted. Sir James Paget, a high authority on the subject, goes so far as to state that "he is disposed to hold that it is not possible to conceive the origin of cancer, or any disease of the kind, except by inheritance." Instead of elaborating ingenious theories, such as the localists employ to get over the difficulties of inheritance, or the still more complicated excuses which the constitutionalists find for cancer skipping a generation or two, it may be well carefully to weigh the facts upon which the doctrine of inheritance is founded. In the 14th vol. of 'St Bart. Hosp. Rep.' I published a short paper on this subject, from which I give the following extract:

"The hereditary nature of cancer is based upon evidence derived from the following sources:

"1st. That it is a matter of common notoriety that cancer runs in certain families.

"2nd. Evidence founded upon certain statistical facts.

"Now, in dealing with the former statement, such evidence is wholly inadmissible from a scientific point of view without the positive facts upon which it is based. Theories uni-

versally held are not uncommonly evidence of a widespread ignorance.

"From time to time isolated instances may occur of an amount of cancer in a particular family in excess of the average to be expected. Such, for instance, as the case narrated by Sir James Paget (vol. xxv, p. 318, 'Pathological Society's Transactions'), in which a lady died of cancer, two of her daughters died of cancer, and eight of her grandchildren; however, the number of her children and grandchildren who did not die of cancer is not mentioned.

"The rareness of such an instance is proved by finding that, out of nearly 300 cases of cancer at St Bartholomew's Hospital, nothing in the least approaching this history is to be found.

"The evidence derived from statistics will now be examined.

"In an article by Mr Baker, in the 2nd vol. of the 'Hospital Reports,' will be found a table of cases from the practice of Sir James Paget. Mr Baker makes this statement, that 22·4 per cent. of the cancerous patients were aware of one or more relatives with the same disease. He then gives a table of 103 cases in which one or more relatives were affected. These 103 cases representing only 22·4 of the

total number of cases examined, the whole number of cases investigated must have been 460. In these 103 cases amongst the relatives are included aunts, uncles, cousins, first, second, and third, great-aunts, and a great-uncle. But since it is impossible to conceive how a man can inherit cancer from his uncles, aunts, or cousins, the necessity for excluding these is obvious. Further than this, the impossibility of knowing the number of these distant relatives, in order to form a table for comparison between a cancerous and a non-cancerous family, renders them useless for our present purpose.

"This objection cannot apply to a man's parents or grandparents; two of the former and four of the latter must be the invariable amount. Now, it is not within the range of ordinary observation that an individual, especially of the hospital class, could even with approximate accuracy assign the cause of death in his four grandparents. The cause of death in the parents is, however, commonly known, especially if the deaths were from cancer. On these grounds, therefore, will be considered the relative frequency with which malignant disease is found in the direct offspring of a cancerous or non-cancerous parent.

"Referring to the 460 patients, these must have had 920 parents, unless brothers and sisters belonged to the same family. This was so in four instance; the number of parents will thus be reduced to 916. Amongst these 916 parents cancer occurred 30 times in the mother, 7 times in the father, or a total of 37 times.

"This gives one parent in every 24·8 who died from cancer. But a person has two parents, therefore the chance will be only 12·4 that one of them died of the disease.

"Thus far it is clear from these statistics that one out of every 12½ cancerous patients whom we question will be found to have lost a parent from the disease.

"Two objections to these facts might well be raised:

"1st. That it is assumed that all the parents of the cancerous patients were dead; but this would not be the case, and that those still living might eventually die of cancer, thus swelling the cancer mortality.

"2nd. That they might have died of an unknown cancer.

"Now, the first objection must readily be admitted, but taking into consideration that in a vast majority of instances cancer is a disease of

advanced middle life, it would be in only a small number of instances that the parents, if living, would eventually die of the disease.

"As a proof of this, it will be found that in the whole series of Sir James Paget's cases only three instances are recorded in which a parent has succumbed to cancer subsequent to an offspring dying of the same disease; this amounts to less than 1 per cent. in the whole number of cases. The objection that the disease might have been an unknown cause of death would apply equally to the Registrar-General's returns, to be presently alluded to.

"The figures given in Mr Baker's table of Sir James Paget's cases will now be compared with those derived from the Register of St. Bartholomew's Hospital. From June, 1869 (the first commencement of registration), till October, 1878, 280 cases of cancer were under treatment in the female surgical wards. Out of these 280 cases in 111 of them no family history of any kind is recorded; in the remaining 169 cases a special record is made as to the family history. In these 169 cases no cancer was known in the parents in 156 instances; in 11 cases either the father or mother had cancer; in 2 cases it was doubtful whether or not one of the parents had

the disease, one of these being so doubtful that I have thought fit to exclude it. There will remain, then, 12 cases amongst 336 parents, or 1 case in 28, or a chance of 14 to 1 against a cancerous patient having a cancerous parent.

"Now, as Mr. Baker very properly observes, in speaking of Sir James Paget's cases, these statistics in themselves do not prove in any way the inheritance of cancer, and this question can only be finally answered by discovering the proportion of cancerous relatives belonging to those not cancerous

"What we have to do is to compare the death rate from cancer in the parents of cancerous patients with the death rate from cancer amongst adults generally. Fortunately in the Registrar-General's returns we have a means of making this comparison.

"It would not be right in this calculation simply to take the whole number of deaths in the community and find out how many of these deaths were due to cancer, for the parents of cancerous patients must certainly have been adults at the time of their deaths.

"The total number of marriages below the age of 20 only amounts to 8 per cent., and the proportion of these who both become parents

and die below the age of 20 is so small a percentage that it can be fairly ignored. Thus, then, we will compare the death rate from cancer in the parents of cancer patients with the death rate from the same disease in all persons in the kingdom dying above the age of 20 years.

"In the ten years 1861 to 1870 in England and Wales—

"1,185,189 men died above the age of 20 years.
"1,194,433 women died above the age of 20 years.

"24,845 men died of cancer.
"56,854 women died of cancer.

"The addition of these figures gives 81,699 deaths from cancer out of 2,379,622, or 1 death in every 29·1 from cancer.

"By comparing these figures with the figures given in the previous page, the following result is arrived at:

"Amongst the parents of cancerous patients the death rate from cancer is—

"1. According to Sir James Paget, 1 in 24·8.
"2. According to St. Bartholomew's Register, 1 in 28.
"3. Amongst the whole community over 20 years of age, 1 in 29.

"The relative frequency of cancer in these two sets of cases differs so slightly that this difference may well be looked upon as acci-

dental, in which case, the figures given in the paper bear proof that cancer in the parent in no way increases the liability of the offspring to suffer from the same disease."

Statistics collected by other observers might lead to different conclusions. Every endeavour, however, has been made to make the foregoing figures accurate, and until more evidence is adduced than is now accessible to prove the inheritance of cancer, I do not feel justified in admitting the doctrine as evidence of the constitutional origin of the disease.

The return after removal.—This, not merely *in sitû*, but disseminated about the body, has been regarded as evidence of the part played by the constitution in the production of the disease. In speaking of this argument, Sir James Paget states: "I would hold that the constitutional element in the origin of cancer is strongly marked in the constancy and in the method of its recurrence after operations—recurrence after complete excision. . . . You may cut out little cancerous tubercles here and there from some old person three, four, five, or six times over, but that is a different disease. You cannot find an instance of rapidly-growing, soft-textured, vascular cancer of any form

which can be removed three, four, six, eight, ten, or twenty times without recurrence, not in the place of growth alone, but in distant organs; and I believe it is vain to attempt to explain this difference of the recurrence in distant and dissimilar parts which we find in recurrent tumours, or, occasionally, in the more ordinary kinds, upon any facts of difference of physical constitution. I observe it is referred to the mobility of cells, to their readiness to travel, that now and then these tumours pass from one part to the other. Now, really there are cancers that multiply themselves in dissimilar parts whose physical condition looks as unfit for travelling as any that could be named. If I could name any kind of cancer which propagates itself more widely and readily than another, it would be osteoid, a mass as hard as any mass of fibrous tissue you ever found in the uterus. I know no fibrous tumour which is so hard as the fibrous mass, to say nothing of the bony structure, of an osteoid cancer, yet it propagates itself speedily and everywhere. Ordinary scirrhous cancer of the breast is at least as hard as an ordinary fibrous tumour; but the one does what the other does not—propagate itself. The recurrent fibroid, or recurrent car-

tilaginous growths, are just as soft, and are composed of cells and free nuclei as little held together as in any of the soft forms of cancer. They do not, except in rare cases, propagate themselves. Cancers do not fail, except in rare cases, to propagate themselves, so that I must maintain that, whichever way we look at them, the facts of the method of propagation to distant and dissimilar parts are so strong, and so characteristic on the side of cancers, that we must assume an essential difference between them and any other tumours that we can name."

But yet this argument, when considered, amounts to no more than stating that there is a marked difference in the physical character of cancer and that of the innocent tumours, a fact readily admitted. If, however, it can be shown, as I will endeavour to do on a subsequent page, that all the particles of the disease found disseminated about the body are the results of the primary tumour, and started from it, then, instead of the dissemination being an argument in favour of the part played by the constitution, it appears to point in an exactly opposite direction.

Now, as regards the outbreak of cancer that

is alleged rapidly to follow an injury, as a matter of fact it is impossible to deny that the actual starting-point of cancerous growth results from an injury in a certain number of cases, and this, too, after injuries of a peculiar nature and in certain parts. The form of injury that apparently starts the disease is not an incised, lacerated, or punctured wound, but rather that form of injury known as contusion, and this, too, often of a trivial nature. Again, the parts in which a malignant tumour follows a blow is generally glandular tissue. A remarkable instance of this formation of malignant disease after an injury is, at the present time, under the care of Mr Thomas Smith at St Bartholomew's Hospital,* the details of which will be found in the footnote.

* E. R—, police constable, in June, 1878, while arresting a prisoner, received a kick on the left breast; it was not very severe but caused him some pain at the time, and did not prevent his being on duty the following day. Twenty-four hours after the injury there was a bruise the size of a florin around the nipple. The marks of this remained for some weeks and then disappeared. Ten weeks afterwards he noticed for the first time some hardness round the nipple, about the size of a small marble. He treated this by fomentations and poultices, but it continued steadily to increase. At the present time, rather more than a year after first noticing the growth, there is a large projecting tumour, the size of a fœtal head; the skin

Now, in this case the constitutionalists would see evidence of a constitutional tendency excited to activity from the injury, for they would say, and probably with truth, that ninety-nine such blows might be struck on as many individuals without producing a similar result, and from this they would argue that there must be a second factor besides the blow to produce such an exceptional phenomenon, and in this factor they recognise a peculiar disposition in the constitution. Now, if such an hypothesis be correct, it would seem that any blow struck on a patient with such a diathesis should be followed by tumour formation; but yet this is not the case, for wounds or contusions of innumerable kinds have, from time to time, occurred to persons who are actually suffering from cancer, yet, save in the rarest instance, no cancerous growth has resulted. The late Mr Morgan narrates an interesting case which admirably illustrates this fact.*

over it is dusky in colour and firmly adherent, while in the axilla are two large glands the size of walnuts. He is a strong burly man, no family history of cancer, and has got rather stouter than thinner during the last six months, when he has been off duty.

* A man was brought into the hospital with a compound fracture of the radius, which had occurred four or five days previously. The whole arm was enormously swollen and in a

Now, I will readily admit that, seeing the exceptional nature of the police constable's case narrated, there must have been some condition in addition to the mere blow to produce so untoward a result, but what I do deny is, that it is necessary to assume that the additional factor should lie in the patient's constitution at large, rather than in the exact character of the injury inflicted or in the particular condition of the tissue struck.

condition of what may be called putrescent cellulitis. There was putrid pus and serum distending the cellular tissue up to the middle of the arm. The general appearance of the man, notwithstanding this, was regularly healthy. His pulse was 84, he had a clean tongue, and ate and slept well. I contented myself by making incisions, expecting that amputation might soon be necessary; by-and-bye the carpal bones and the head of the radius became carious, many of the former were removed, the head of the ulna exfoliated. There was copious suppuration, at first foul but afterwards becoming healthy. During all this time, a period of a couple of months, he retained his health, eating, drinking, and sleeping well, with a good colour and slow pulse. I determined to let nature have her course. All at once he was seized with peritonitis. I feared it was pyæmic peritonitis and that I had carried the experiment too far. He died and it was found that the peritonitis was due to a portion of the gut having got entangled in a band, the result of a peritonitis which he had told us he had previously suffered from. But in addition to this there was found in the pelvis and lower part of the abdomen a mass of colloid cancer, while the omentum and intestines were throughout studded with nodules of the disease of various sizes.

Having mentioned some of the chief arguments used by the constitutionalists to support this view of the origin of the disease, it will be well to glance at those features in the history of cancer, which point most strongly to its having a local origin, the constitution only becoming secondarily tainted. Now, first amongst these we have the evidence of the tumour itself, a single spot being alone affected, the rest of the body being in perfect health. In fact, the first indication of the disease being its local manifestation. As an instance, I will take a case*

* A woman, aged 45, had enjoyed thoroughly good health since she was a child. A few months ago she began to feel slight discomfort in the right breast. This came on so gradually that she could fix no exact date for its commencement. A week ago she noticed for the first time a hardness in part of the right breast. She is still in perfect health and has no pain to speak of. On examination a hard nodule is felt deep in the breast, but no perceptible glandular enlargement. An operation was advised but declined. She again applied to the hospital four months later; her condition was then much altered, the tumour was larger and very painful, and in the axilla was a gland as large as a pigeon's egg; she had lost appetite and her nights were often sleepless. She had quite lost her good looks and complexion, her face being thin and careworn; she was very considerably thinner. Being very anxious for an operation the breast was completely removed, together with the axillary gland; the wound healed rapidly. She left the hospital in good spirits, and during the next few months she regained her appetite and once more looked fairly

which was under my care at the Royal Free Hospital as being fairly representative of what is commonly observed.

Now when the patient was first seen her health was good, but anxiety of mind, sleepless nights, and pain, soon told their tale, and accounted for the so-called cachexia. After the removal of the local disease she regained to a great extent her former health, only to be lost when the disease returned. Such a history is common in cancer, all the constitutional symptoms being consecutive to the tumour.

Secondly, the manner in which cancer spreads and propagates itself. There are four methods by which the disease extends. Three of these methods of extension are as clearly recognised, and as universally allowed as any fact in pathology, viz., growth from its periphery, extension by the lymphatics, and dissemination in the course of the blood-stream. The fourth method is by auto-inoculation, but notwithstanding the utmost importance that should be attached to this method of extension, it is practically ignored by the majority of authors on the

healthy; unfortunately six months after the operation the disease returned *in situ*, she became rapidly cachectic, and, I believe, died 8 months later.

subject, although it has not escaped the observation of such accurate pathologists as Dr Moxon, Dr Goodhart, and the late Mr Morgan. Almost every museum affords specimens of malignant ulceration of the stomach with patches of cancer scattered here and there along the small intestines or colon. The appearance of these specimens combined with their clinical history leaves little doubt but that these deposits are secondary to the gastric disease. In the Middlesex Museum is a cancerous ulcer in the stomach of a boy who had previously suffered from the same disease in the mouth. In the Pathological Society's Transactions it will be found recorded, and specimens have been exhibited showing how the uterus has become inoculated with cancer through the Fallopian tubes from a diseased ovary, how the lungs and bronchi have become infected from a primary cancer of the larynx, and even the skin of the abdomen become cancerous from contact with a pendulous breast already diseased.

The original tumour having existed an indefinite period the disease becomes in time widely disseminated about the body. Yet the sequence in which the various structures become affected leave no question as to the disease being pro-

pagated from the primary tumour, the parts first infected are almost invariably those structures in direct communication with the primary growth by means of the lymphatics and blood-vessels. As a sequence to rectal cancer such deposits will always be found in the sacral glands and liver. Moreover, it is a well recognised physiological fact that one of the functions of both lymphatic glands and the liver is to act the part of a filter the one to the lymph, the other to the blood, and to arrest in their tissue any morbid material which would otherwise find admission into the general circulation. A something is carried off by these channels from the primary tumour, and this something either itself grows into, or by its presence excites the formation of, a morbid growth at the points mentioned at which it becomes arrested. These points in their turn each become another centre from whence the disease is further distributed. There are few better instances of observing the spread of malignant disease from a single centre that is afforded by the melanotic cancer or sarcoma.

In some of these cases the secondary growths can be as clearly traced from a single primary centre as can the abscesses of pyæmia from the

original wound. A remarkable case of melanotic sarcoma has been recently under the care of Mr T. Smith at St Bartholomew's Hospital, and is so illustrative of dissemination from a single point that I venture to give a brief account of the case, the full details of which will be found recorded by Mr Butlin and myself in the sixth volume of the Sitwell Ward Register.

The patient, a healthy woman æt. 27, had upon her right leg a small dark-coloured mole which had been there since her birth. A year previous to admission into the hospital a small warty excrescence appeared on one part of the mole. This she treated with caustic, which in a few days was followed by some tenderness of the groin below Poupart's ligament. In the course of a few weeks a tumour made its appearance in the groin, at first no larger than a nut; other swellings soon appeared both above and below Poupart's ligament, and also in the popliteal space. Each of these soon developed into well marked tumours. After the lapse of nine months from the first application of caustic, tumours had appeared over the clavicle, sternum, and abdomen, while there were obvious symptoms of tumours in many internal organs. She was removed by her husband from the hospital

in a dying state, eleven months after the application of the caustic. No opportunity was afforded for a post-mortem examination.

Now, when we see the manner in which malignant diseases spread, it is impossible not to be struck with the close analogy it bears to any poison introduced into the body locally, such, for instance, as the poison of septicæmia, glanders, or syphilis. The constitutionalists, admitting the extension of cancer by the channels mentioned, see in it only another proof of the predisposition; they say that a something is absorbed that irritates a gland and this irritation, instead of subsiding or going on to the formation of an abscess as it would in an ordinary case, excites the formation of cancer owing to the predisposition to that disease inherent in the patient. Sir W. Jenner expresses this by saying that "Something is absorbed, it is not necessarily pus, there is a disposition in every part to burst forth into cancer, when an exciting cause is applied; something is absorbed from the part which irritates a gland, and in the constitutional state of the patient, cancer is produced instead of abscess or extravasation of blood, or thickening of a tissue. Whether it goes by the lymphatics or the veins is a matter

of insignificance; it would not develop into cancer unless you had a primary condition in the patient, viz. a disposition under irritation to form cancer."

Yet it would seem to me as reasonable to hold that the disseminated abscesses of pyæmia or the tertiary gumma in syphilis, were due to predisposition in the constitution of certain individuals to form such masses "under irritation." But no one for one moment doubts that the characters of the secondary effects of pyæmia and syphilis are stamped not by the constitution of the patient, but by the specific nature of the original poison.

Certain local applications have the undoubted property of exciting malignant growth, the example of this is to be found in chimney-sweep's cancer of the scrotum.

To suppose that sweeps as a class have a constitutional tendency to cancer is an obvious absurdity. It must, therefore, be acknowledged that it is due to an irritant locally applied. The question would further arise as to whether this cancer of the scrotum is caused by any specific irritation inherent to soot, or whether any irritation constantly applied to the skin of the scrotum will produce similar results. Now,

seeing that there are many forms of manual labour by which the parts in question are kept constantly irritated by dirt, yet the impunity of cancer in these circumstances points rather to some specific irritation due to soot; possibly the exceeding fineness of the particles may afford an explanation, but I will not venture at present to speculate on this matter. The fact, however, and that too of the greatest importance, remains, that a local irritant can produce what is at first certainly a true local disease. In this form of cancer the commencement of the disease is almost obvious, its gradual progress can be traced until neighbouring glands become implicated and the patient ultimately dies of the disease. It is in this class of case that the sufferer being aware of the nature of his malady applies for advice at an early stage, and the surgeon will operate with a fair hope that the cure may be permanent.*

* In 1872, when I was House Surgeon at St Bartholomew's, the sweep to the hospital applied for advice under the following circumstances:—Three years previously (1869) he noticed upon his scrotum a small growth about the size of a fourpenny piece. He had this removed, the operating surgeon doing little more than just cutting it off. He remained well for over two years, when a slight growth appeared in the cicatrix; this extended with some rapidity, for in three months an epithelial ulcer the

When there is such positive evidence that the disease is local in a particular case, and when there is no proof that it is due to a constitutional origin; it is more logical to assume that the disease always has a local though unknown cause than to regard as of an exceptional nature the cases in which local origin is obvious.

Now taking into consideration the points in the history of cancer upon which we have already touched, it would seem that the preponderance of evidence is strongly in favour that the starting point of cancer lies in some local condition of the part attacked rather than in any predisposition in the constitution at large. In these circumstances while seeking for the cause of the disease it is natural that pathologists should have paid considerable attention to the structure of the growth itself, but yet in studying the histology of the tumour we are rather examining the product of the disease

size of a penny was produced. The glands in the groin were not involved. He submitted to an operation, and this time the growth was removed by Mr. T. Smith, who cut at least three-quarters of an inch wide of the growth. The wound healed rapidly, and the patient still remains well, July, 1879. It seems impossible to doubt the local nature of the disease in this case.

than investigating its cause. What the surgeon removes, and the microscopist cuts into sections cannot be the cancer, that is to say, the whole cancer seems pretty evident by the disease remaining in the patient and ultimately causing his death. What has been removed consists of a mass of hypertrophied tissue and cellular element formed as the result of a disease, portions of which have most certainly been left behind. No doubt that part which appeared to be acting most violently had been removed with the tumour, but what remained behind alone required time to increase and to become as active as the part already removed. Perhaps there may appear to be some ambiguity in the way I have used the word cancer in the preceding paragraph for whereas the term has previously been used to express the sum of the materials which form the tumour, the sense in which I have just used it, is meant to express the unknown condition of a part which leads to the formation of a malignant growth.

The careful study of the tumour itself by the microscope has in a way greatly increased our knowledge of the disease, and supplied us with a vast amount of valuable facts; but yet I doubt whether, by the study of the tumour

alone, the true cause of its growth will be eventually established; certainly, if for our knowledge of pyæmia we had been dependent upon the microscopic examination of the secondary abscess, we should never have attained to the knowledge which now enables us so successfully to contend with that scourge of surgery.

If the tumour be cut into sections and examined, it will be found that there is nothing mysterious in the elements of which it is composed. The cells which represent the growing part of its structure are similar to those naturally existing in the part affected, and moreover often have a tendency to form themselves into glandular tissue, with a structure more or less in imitation of the healthy glands in the immediate neighbourhood. The source from which the cells forming the tumour are derived would seem to be almost certainly the pre-existing cells of the part and are the result of a proliferation of the lymphoid and epithelial cells previously existing in the healthy tissue. They are endowed with sufficient vitality for self multiplication, and thus increase long after the original cells from which they are derived have been destroyed. Since it is the accumu-

lation of these cells that form the tumour, it is to the cause of this accumulation that attention should be directed. To account for this accumulation it is necessary to assume that the relation between renewal and removal of cells by which a part is normally kept in health is altered, and that the accumulation is either due to an over-production or a diminished power of removal, or possibly both combined. The first of these hypotheses, that is, a simple over-production of cells, without an alteration in their character, such as is observed in response to some nerve stimuli or hyperæmic condition, might account for the local tumour and possibly for glandular engorgement, but yet it would altogether fail to account for the most characteristic phenomenon in the cancer, viz. that of dissemination through the body notwithstanding the removal of the primary growth, for it is certainly known that even amputation of a limb commonly fails to prevent dissemination.

If the collection be not due to a simple over-production we fall back upon the second hypothesis, the want of power in the tissues to get rid of their surplus cellular products.

That this difficulty does not depend upon any accidental mechanical obstruction to the

lymphatics seems certain, for if an obstruction existed in the lymph path, it must either lie in the lymphatic gland itself or between the gland and the disease, or beyond the gland. If the obstruction be in or beyond the gland, the gland itself would be primarily affected, which is not the case. If, on the other hand, the obstruction existed between the disease and the gland, the gland would never be affected at all, which is contrary to fact.

Seeing that the cell-collection neither depends upon simple over-production or accidental obstruction of the lymphatics, it must of necessity be concluded that there is some specific alteration in the cells, or some specific material capable of absorption by the lymphatics. By specific alteration in the cells is meant that, from some special cause, the cells produced at a particular part are not merely increased in quantity, but that their physical nature or vital functions are so altered that they can only be carried off by the lymphatics with difficulty, again to become arrested at the nearest glands, while in their new situation, wheresoever arrested, they display the same tendency to multiply and form tumours as they exhibited at the primary spot of disease. Ac-

cording to this view, the actual particles of disease consist of or reside in the cells themselves which, migrating from the primary tumour, become the agents by means of which the disease is disseminated, and the relations existing between the cells of the primary and secondary deposits are as parent to offspring. If the disease consisted of some morbid poison apart from the cells merely exciting their growth by its presence, it might be argued that the cells producing the growth and secondary deposits would not be derived from the parent disease, but rather that the particular morbid material which had caused the cells to collect and grow at the original site had passed along the lymph and blood-vessels, exerting its baneful influence upon the cellular elements of the parts in which it became arrested, thus causing the phenomena of secondary tumours. The evidence, however, to support the view that the starting point of the secondary deposit is from cells derived from the parent disease is very strong. Not only do the individual cells of the secondary growth closely resemble those found at the original site, but they actually grow into a structure similar to that forming the original disease. For instance, if in the

original disease cartilaginous nodules can be detected, it is nearly certain that the portions of cartilage will be found in the secondary deposits. Again, in rectal cancer, as we shall subsequently show, the new growth consists of a glandular structure identical with, or closely resembling, Lieberkühn's follicles. Now, Moxon and others assert that they have frequently seen a reproduction of these same follicles in the secondary deposits in the liver following rectal disease.*

Now, had the secondary deposits been due to some poison, apart from the cells, which had migrated from the original tumour, it could be understood how secondary growths might develop at those points in the lymph or blood current where it became arrested; but then it would be certainly expected that this poison, exerting its influence upon the cells normal to

* I must state that I have accepted the fact of these secondary deposits from the observation of Moxon and others, and have not been able to verify it from my own experience. It is not easy to obtain fresh specimens of these deposits. In four instances, however, I have carefully examined such growths, and in none of these cases can I state that I have seen any growth which I could certainly identify with Lieberkühn's follicles; indeed, the growths appeared to me to be arranged upon a plan closely resembling that of the liver structure itself.

the part in which it was arrested, would cause the development of a tumour, not in the likeness of the original disease, but rather after the plan of the tissue or gland in which it was arrested, viz. the secondary cancer in the liver should resemble liver structure rather than that of the mucous membrane of the rectum.

In cancer of the rectum, as will be subsequently proved, the product of the disease is a vast accumulation of more or less perfectly formed gland tissue; and it will further be shown that this new tissue, both as regards its individual cells, and its general plan of structure, is nearly identical with the glandular tissue normally found in the mucous membrane of the part.

For reasons already mentioned, the cause of this cell collection and growth into superfluous gland tissue would appear to reside in the cells themselves, which being once diseased perpetuate their abnormal condition in their offspring. The nature and cause of this alteration is unknown; nor is this surprising when we consider how little at present is known of even the normal functions of the myriads of epithelial cells lining the intestine.

Many physiologists maintain that the func-

tion of these cells is the secretion of mucus, but, as mentioned on page 44, it does not seem improbable that they may have other and higher functions. At any rate they appear to have individual life, and primarily obey the great fundamental law of self-multiplication, during which function their secretion and offspring may be utilised for the normal nourishment and repair of the body in which they are situated.

The morbid nature of the cells may be due to their responding to some normal stimulus excited out of season by a blow or injury, as suggested by Dr Creighton in his admirable observation on the natural evolution of gland tissue; or the altered condition of the cells may result from some influence extraneous to the body and introduced into the circulation from without, the extravasation of blood following a blow leaving it sufficiently long in contact with the cells of a gland to cause their infection.

I feel, however, that this problem of cancer is not to be solved by speculation on ill-considered hypotheses. Physicians from the earliest dawn of medical science have been busied in speculating on this problem, and yet have

scarcely advanced a step in its solution. In recent years some progress has been made in our knowledge of the structure of the tumour, but such knowledge has only been arrived at by the aid of microscopic examination. If knowledge of the disease is to advance it will be by the continuation of this process of investigation, aided by clinical observations and accurate experimental research. With this view in the following chapter I will give the results as briefly as possible of the histological characters of malignant growth as found in the rectum. The observations made are fragmentary and imperfect, but I venture to give them in order to compare notes with other workers in the same field.

CHAPTER II

RECTUM IN HEALTH

Before considering the morbid appearance of the rectum, a brief description will be given of that organ in health. The common description of the rectum will be adhered to, viz. that it consists of four coats—mucous, submucous, internal muscular, and external muscular. These coats can readily be separated the one from the other by dissection. From the mucous and submucous tissue many fibrous bands run down perpendicularly between the bundles of muscle, and these fibres becoming slightly thicker form a septa between the muscular bands (figs. 1 and 2, Plate I). Upon reaching the plane between the external and internal muscular coats a large number of the fibres assume a horizontal direction, while others pass vertically into the external coat, where they again form the septa between the bundles of muscle.

Some fibres pass quite through the external coat and blend with the fibrous stroma of the surrounding fatty tissue. From the perpendicular septa dividing the larger muscular bundles numerous fine processes pass off between the muscular fibres; these again subdividing form the ultimate sheaths of the individual fibres of muscle. It will be thus seen that the connection between the various coats is formed by portions of fibrous tissue being directly continuous from one to the other, and also by the continuity of the blood- and lymph-vessels. The total thickness of these coats collectively varies greatly in different subjects. The variation is found chiefly in the muscular coats, the other two coats remaining pretty constantly of the same thickness.

The measurements of a specimen taken from a healthy rectum, three to four inches from the anus (fig. 2, Plate I), are as follows :—Thickness of mucous membrane, that is, from base to apex of a follicle, millimètre 0·4; the thickness of the submucous coat is not so easy to determine, its tissue being so loose that it spreads out on section; its thickness is probably, however, somewhat less than half a millimètre.

The mucous membrane consists of Lieberkühn's

follicles and the intervening tissue. The follicles are tubular depressions arranged with great regularity; they are set so close together that the width of the intervening tissue is, on the average, about one sixth the diameter of the follicle. This arrangement is well seen in fig. 2.

The length of the tubes is about four or five times their diameter, the respective measurements being—length, millimètre 0·35; diameter, millimètre 0·08. These tubular depressions are lined with epithelial cells arranged with their long axes at right angles to the cavity. The apices of these cells look into the cavity of the follicle, while their bases rest upon the adjacent retiform tissue.

On cross section it is seen that from fifteen to twenty cells are required to complete the circular lining. While from above downwards their number amounts to forty or fifty. Taking the higher figures in each case, $20 \times 50 = 1000$ will represent the number of individual cells in each tubular depression. In each square inch of the large intestine there are about 57,000 follicles—the number of cells $57{,}000 \times 1000 = 57{,}000{,}000$—in each square inch. These cells are directly continuous with those lining the surface

of the mucous membrane, and are, therefore, continuous from one follicle to another.

The length of the individual cells vary greatly, but have an average length of about $\frac{1}{600}$th of an inch, with a diameter of $\frac{1}{2000}$th. The lumen of the follicle occupies one third of its diameter.

It is difficult to conceive that any of these cells can have a separate existence, for each one is dependent upon its neighbour. The appearance of the cells, in fact, is analogous to the bee's honeycomb, that is to say, that the intervening wall is common to two cells, or has become common by fusion with its neighbour. This appearance is seen in fig. 20, Plate II, the pressure of cells one upon another causing them to take a well-marked hexagonal form. The cell boundary is a structureless material formed by a condensation of the peripheral portion of the cell substance. The interior of the cell contains a semi-transparent material more or less granular. One or more nuclei are contained within the cell, situated nearer the base than the free end.

The intertubular tissue consists of a fine trabecular network, the meshes of which are very long in the vertical direction, looking, as is probably the case, like narrow lymph-paths

running in a direction parallel to the follicles. These meshes are filled with small cells (leucocytes). Perphaps, however, it is hardly right in health to describe the interfollicular tissue as a network, since it is often not more than a single channel. Lymphoid tissue also forms the bed upon which the tubular glands rest. This tissue is well supplied with blood-vessels. A further description of the origin of the lymph-spaces will be found on page 46.

The submucous coat is chiefly composed of a network of retiform tissue, in which blood-vessels ramify freely. The whole of this network of spaces gradually converges towards the thin straight lymph-paths which run horizontally both in the submucous tissue and between the layers of muscular fibre.

Since, however, the whole of my sections showing the commencement of the lymph-spaces have been taken from morbid specimens, a detailed description of them will be found further on.

The principal office of the mucous membrane of the rectum is absorption, although, at the same time, its surface supplies the lubricating mucus for the fæces. Proof of its absorbing function is supplied by positive evidence. A

few ounces of beef tea injected up the rectum rapidly disappears.

Narcotics, especially opium and its preparations, are absorbed as quickly by the rectum as by the stomach. Sometimes the absorption by the rectum is more rapid than by the stomach. The injection of strychnia may be taken as an example.

Without such positive proof the identity of structure between the rectum and the small intestines would afford strong presumptive evidence that they had similarity of function. A careful examination proves the analogy between the villi and follicles, for it can be demonstrated that the follicles are nothing more than what may be described as inverted villi.

A glance at the drawing (fig. 2, Plate I) will show the alternating arrangement of the follicles and villi.

It would appear as if every endeavour had been made to make available the largest possible surface upon which to spread out epithelium.

Supposing for a moment that it was possible to stretch and spread out a portion of the intestinal mucous membrane in such a way that both the follicles and villi became flat, that is,

on the same level, a suface would be formed of columnar epithelium resting on a bed of lymphoid tissue, in which lymph-ducts would be ramifying together with the small blood-vessels, and the surface corresponding to the villi or follicles would lie on the same level and be identical in structure.

The surface occupied by the spread-out membrane would cover many times the area of the same membrane when corrugated into the projections of villi or the depressions of follicles.

Another proof that the villi are nothing more than the growing up of the interfollicular retiform tissue is to be found in the morbid growth of the rectum, known as villous tumour, in which form of growth it can clearly be seen that the villi are produced in this manner. Again, it would be mechanically impossible to have a villous arrangement of the mucous membrane without corresponding follicular depressions.

Seeing the structure is identical and the position merely altered by necessity, it is difficult to conceive that the two have distinct functions. In the large intestine it is possible that the absence of villi is on account of the increasing firmness of the fæces and the diminution of the amount of digested material

requiring absorption, the surface lining the depressions being sufficient for purposes of absorption without the villous projections, which would be liable to injury from the hardened fæces.*

The whole surface of mucous membrane being lined by epithelium, it is clear that absorption must take place through the epithelium or through the substance between the individual cells.

It appears, however, highly probable that this so-called intercellular substance (or spaces) is nothing more than the blended outline of two adjacent cells, on the grounds given on page 75, in which case absorption would really take place through the epithelial cells themselves.

Possibly the nuclei of columnar epithelium may be the means of taking nourishment into the body by escaping into the retiform tissue between the glands, and then becoming lymphoid cells.

I do not profess to prove that the epithelial

* As an instance of this, a specimen of the College of Surgeons (No. 1288), in which colotomy had been performed twenty years before death, may be taken as an example. The whole mucous membrane below the opening in the colon is thickly covered with villi.

nuclei and the lymph-cells are identical, or even, if so, that the direction of lymph-cells is rather from the epithelium than towards it.

I will, however, briefly state the grounds upon which the possibility of such a theory is based.

Healthy mucous membrane could not be obtained sufficiently fresh from the human body. The specimen from which the drawings are taken were cut from the mucous membrane in the neighbourhood of disease during life, and immediately transferred to chromic acid or spirit.

1. In some cases of disease the epithelial nuclei are very large and darkly pigmented, so that they become prominent objects under the microscope, and can be easily traced (fig. 1, Plates III, X, XI).

2. In size or shape generally no difference can be detected between these nuclei and the lymphoid cells. The difference that is sometimes seen can be easily accounted for by the effects of pressure.

3. The difference of position alone remains, and this is not constant, for in many instances there is an almost direct continuity between the two classes of cell elements, such, for instance, as is seen in Plates III, X, XI, where it is impossible to decide whether the cell be still a

nucleus within the epithelium, or a lymphoid cell in the retiform tissue.

It would seem as if the nucleus passed first into the space lying between the epithelial cells close to their bases, and that this space is the commencement of the lymph-radicles (fig. 2, Plate XI).

CHAPTER III

PATHOLOGY

MALIGNANT disease of the rectum has been usually described as including the four varieties of cancer known as scirrhous, medullary, epithelial, and colloid. The more familiar one becomes with malignant rectal disease the less possible is it to draw any fast line between the first three of these varieties. It is not asserted that the appearances presented to the naked eye or under the microscope are similar in every case, but it is more than probable that the variation in structure noticed in different specimens should be regarded as depending more upon the character of the disease and the tissue affected than upon any essential difference in the nature of the original disorder. It not uncommonly occurs that the special characters presumed to be typical of each variety may be observed in the several portions of the same

specimen, or a growth which, when first removed by operation, presented one type, will, on its recurrence, present another.

Colloid cancer must be excepted from the common category, for it has special peculiarities by which it can be easily recognised. Whether these peculiarities are expressed by the original disease, or whether they depend upon the patient's general condition, will not now be discussed, but they are sufficiently distinctive to exclude it from the disease about to be considered.

The chief characteristic in malignant rectal disease is, in almost every case, a development of gland tissue in an abnormal situation.

I say advisedly in almost every case, for now and again, though rarely, specimens of undoubted malignancy are met with, but yet glandular growth in the submucous tissue cannot be recognised. Such specimens, when examined, present for the most part a structure of dense fibrous tissue with only a small amount of cell-element, but an exactly similar structure is nearly always found in some portion of the most typical adenoid growths, where it appears to result from a change in the tissues at the base of the tumour. It is very possible,

therefore, that in the exceptional specimens alluded to, that either the glandular growth existed, but escaped detection, or it had existed at an earlier stage in the disease, but had passed away by the time the tumour came under examination. The primary growth consisting of gland tissue, I prefer to use the term adenoid, as better expressing the real nature of the growth than the word cancer.

By gland tissue is not meant that the growths under consideration are structures similar to the lymphatic glands of the body, but that they are more or less after the same model or plan as the lenticular or Lieberkühn's follicles of the large intestine. Here, again, it must be understood, as described on p. 42, there is no real difference in structure between crypts and villi, a crypt being nothing more than an inverted villi, while the villi is merely the prolongation of the tissue between the crypts. The one cannot exist without the other, and each may be briefly described as having a central stalk or layer of retiform tissue, covered on all sides by a single layer of epithelial cells. In some of the new growths the tissue has so close a resemblance to an aggregation of Lieberkühn's crypts that it is scarcely possible to distinguish

the morbid from the natural tissue, while in other specimens the new structure is so vaguely defined that it is only after the most careful investigation that its identity with gland tissue can be proved. In an endeavour, to some extent, to classify the varieties of adenoid growths, it may be well to divide them into two classes according to their degree of development, 1st, the embryonic adenoid disease; and 2nd, the true adenoid disease. The former includes the malignant diseases described as the varieties of sarcoma and cancer, while the latter is represented by the papillomata or villous tumours. It must not be supposed that there is any clear line of demarcation between these two, but they should rather be considered as representing two opposite types of a common disease.

Malignant adenoid is typically represented by an exceedingly rapid growth, running its course in a few months, while the innocent type may be an indefinite number of years in progress without causing injury to the body. Between these two extremes are found the various gradations that establish the identity of the one with the other. It is proposed to consider first the malignant adenoid disease. This, in its method of growth,

presents two well-marked varieties, the chief characteristic of the one being its tendency to spread as a thin layer between the mucous and muscular coats of the bowel, while the other increases more uniformly in all directions, thus producing a distinct tumour.

The horizontal form of the disease is the commoner, and when well marked it exists as a thin layer of adenoid growth spreading in a horizontal plane between the mucous and muscular coats. The thickness of the growth is often not more than a quarter of an inch, while its area may extend over several square inches. At an early stage it feels like a flat foreign body between the mucous and muscular coats, slightly more raised at the centre than towards the circumference. The mucous membrane is firmly attached to the subjacent growth, while this in its turn is adherent to the muscular coat; it gives one, in fact, very much the idea of the inter-fibrous bands naturally running from one coat to the other, being rendered tight by new growth being deposited between the fibres. The diseased portion of bowel is, as a whole, at first fairly movable upon the surrounding structures.

As the layer of the disease spreads it is not

always in a regular manner; it usually extends more rapidly in a lateral than in the direction of the long axis of the bowel. Indeed, it appears to correspond somewhat with the distribution of the nerves and vessels of the part. The result of this lateral extension is often seen by the whole circumference of the bowel being affected, while the width of the ring of disease is less than an inch. It is this form of disease which constitutes the annular malignant stricture so common in the large intestine.

Every pathological museum affords specimens of this annular form of disease.* After a while

* In the Middlesex Museum will be found two beautiful specimens; they stand side by side, and are numbered 116 and 117, series 8. In both these cases the canal of the bowel is almost obliterated, one of the specimens only admitting No. 2 catheter. These specimens both show how strictly limited is the disease, for although the whole circumference be involved, it does not occupy more than an inch in the length of the bowel. The disease has destroyed the mucous membrane, and sprouts into the bowel from all sides, thus causing its occlusion. The peritoneal coat is bulged outwards, and forms a distinct boundary to the disease. The history of the second of these cases is narrated in the seventeenth volume of the Pathological Society's 'Transactions.' "E. M—, aged 57, a carpenter, had always enjoyed good health till about five months before his death, when he became liable to attacks of severe stabbing pain about his navel. These would sometimes last for a day or two, and prevent his working, and they were generally accompanied by

ulceration of the mucous membrane over the centre of the growth takes place, and the membrane is generally slowly destroyed from the centre towards the circumference. Sometimes the ulceration of the mucous membrane commences at many points at once, so as to give it a honeycombed appearance, and the growth

constipation. He also fell away in flesh, and his strength declined. On April 7th he had more than the usual pain, and from this date there was no discharge from his bowels. When seen on April 14th his bowels had been confined for a week; he complained of great pain about the navel, the belly was tense and tympanitic, and the outline of the distended coil of intestine was visible. Close to the navel was a small nodule beneath the skin, and this point was very tender. The patient was emaciated, his pulse feeble, tongue dry, and he occasionally vomited, the matter ejected having a fæcal odour. He passed urine abundantly. During the next few days the vomiting abated. The presence of the nodule beneath the skin, and the falling away in flesh and strength before the occurrence of constipation, were sufficient to diagnose a cancerous stricture; and, although it was almost certainly situated in the colon, it was not thought advisable to have recourse to any operation to relieve a disease which must in a short time prove fatal. He gradually sank and died ten days after the obstruction commenced. On post-mortem examination there was found a stricture in the middle of the transverse colon, which would barely admit the tip of the little finger. The walls of the intestine for the space of an inch were much implicated with cancer, and on the mucous surface was a deep ulcer extending nearly all round the bowel."—Vol. xvii, p. 140.

can be seen projecting through these holes in the mucous membrane, but this is not common. After a while, instead of the centre of the growth being its most prominent part, it becomes excavated and depressed by ulcerative action that commences in the mucous covering and extends to the disease, which, in its turn, becomes eaten away. At first the base of the ulcer will consist of the new adenoid growth; as this becomes completely destroyed the base of the ulcer is formed by the remains of the muscular coat, generally blended into a firm, hard, cicatricial mass, by the great hypertrophy of its bands of inter-muscular fibrous tissue, the prolongations from which extend into the surrounding fatty tissue, and by their contraction appear to draw it towards the disease. Towards the edge of the ulcer the new growth, with the hypertrophied disintegrating mucous membrane lying over it, is apparent. The edge of the ulceration is hard and raised and often overlaps the healthy mucous membrane. It sometimes happens that after the destruction of the mucous membrane, instead of the subjacent adenoid growth sharing the same fate it continues to increase, especially at certain points, and projects as a fungoid mass into the bowel cavity,

and thus becomes identical with the second or projecting variety of the disease.

This second variety commences in a similar manner to the one just described, that is, as a deposit between the mucous and muscular coats. The deposit is generally at a single spot, but there may be several nodules sprinkled over a considerable area. Instead of the growth extending in a thin layer between the coats it increases in size pretty regularly in all directions, and forms a distinct oval or circular tumour projecting into the bowel cavity. Such a nodule may attain the size of a pigeon's egg, or even larger, yet still retain an intact mucous membrane over its surface. But the mucous membrane will, after a while, give way, and the growth, released from pressure, quickly forms a fungating mass projecting into the rectum.*

* Specimen 1217, Royal College of Surgeons, is a good example of this form of growth at the time when the mucous membrane is just giving way. There is a tumour, which has raised the mucous membrane and projects into the cavity as a nodule, the size of a pigeon's egg. On the surface of this nodule the mucous membrane has been destroyed in two small circular patches, one the size of a sixpence, the other about a quarter as large. At these spots the growth, relieved from pressure, slightly projects, but is rather smooth than fungating. There are two smaller nodules in this specimen about half the size of the one described; over these the mucous membrane is

If an attempt be made to dissect the coats of the rectum, the one from the other, in the neighbourhood of the disease, it will be found scarcely possible to do so, for each coat seems firmly blended to its neighbour. It can be readily seen that this abnormal blending of the coats is due to great hypertrophy of the fine

still intact. In the same museum will be found a specimen No. 1221. This specimen (or rather specimens, for there are two in the bottle, the second and most interesting being placed at the back, so that it cannot be seen without turning the bottle round) shows two forms of the disease in the same intestine. It is described in the catalogue as "a portion of the jejunum, on the inner surface of which is a flat tumour, superficially lobulated, occupying the whole circumference of the intestine for about two inches wide. The tumour has a soft obscurely fibrous structure, and part of the surface is ulcerated. On another portion of the same intestine a smaller nodule has been cut through, and its section presents a soft surface with long threads hanging from it." This nodule, which is as large as a plover's egg, projects into the bowel cavity like the half of a sphere. The peritoneal surface of the bowel is quite level and not pushed out by the growth. The mucous membrane is perfectly intact over the tumour; on section it looks like a collection of exceedingly fine vermicelli crowded and squeezed together; here and there a loop or end of one of these has been drawn out from the cut surface and hangs down like a fine coil of thread over an inch in length. Upon further examination they are apparently enormously lengthened villi crowded and pressed together, but not adherent. Some of these are two inches in length, but retain a uniform thickness throughout.

bands of the connective tissue that normally pass from one coat to another.

On section the borders of the diseased patches will be found raised a quarter of an inch above the level of the neighbouring bowel, and overlap the surrounding healthy membrane to a considerable extent. This heaping-up is caused by a soft, flocculent-looking growth in the submucous tissue.

The portions of the muscular coats subjacent to the diseased mass are considerably altered. They appear at first sight to be greatly thickened and intersected by dense, glistening, fibrous-looking bands. These bands blend in a dense mass of cicatricial-looking, fibrous tissue situated external to the muscular coat, and thick bands again pass out from this and are continued into the surrounding fat, and are imperceptibly lost by a gradual blending with the natural fibrous stroma of that tissue.

On a more minute examination the mucous membrane bordering on the portion destroyed by ulceration is found thickened by a large accumulation of hypertrophied papillæ, looking much like the circumvallate papillæ of the tongue, giving a villous, velvety appearance to

the membrane. Beneath this hypertrophied membrane is a large quantity of retiform tissue, in the deeper portion of which is found the new adenoid growth, consisting of a soft, caseous material, dipping down here and there a considerable distance towards, and even between, the muscular fibres (see Pl. I, fig. 4). These portions that dip down are seen to lie between, the glistening white fibres already alluded to as intersecting the muscular coat. These dipping portions sometimes expand at their extremities so as to have the appearance of inverted flasks, and in places are distinctly lobulated. The little masses are only loosely adherent to the walls of the spaces in which they lie, and when picked out with the point of a needle the cavities in which they were contained are smooth. The boundaries of these cavities are the glistening fibrous tissue before mentioned (Plate I, fig. 4 *c*, *c*).

By the aid of a pocket lens it will be seen that although the growth lies free within the space of this fibrous tissue, yet at one or more places processes of fibrous tissue enter the growth and break up into separate branches of fine fibrous or retiform tissue, and it is upon these, as will presently be shown, that the

columnar epithelium is arranged in a bipenniform manner (fig. 2, Plate IV).

As the adenoid growth extends downwards, it takes the place, and causes the absorption, of the bundles of muscular fibres lying between the fibrous trabeculæ, the trabeculæ themselves, however, instead of being destroyed appear to become greatly thickened.

Beneath the central or older portions of the growth, the muscular coats are replaced by dense white fibrous tissue. This tendinous-looking fibrous tissue is the result of enormous thickening of the natural fibrous tissue between the muscular fibres. The thickened fibrous tissue extends beyond the muscular plain and branching into the surrounding fat blends with its fibrous stroma. These branching fibres undergoing contraction draw the fat and neighbouring tissues towards the diseased portions.

In the majority of specimens examined after removal considerable ulceration has taken place. Often towards the centre of the growth the mucous membrane and the whole of the subjacent new growth has disappeared, the floor of the ulcer being formed of a firm hard mass, consisting of partially destroyed muscular fibres and the dense cicatricial tissue already

alluded to; towards the margin of the ulcer, however, the new growth becomes apparent, with the hypertrophied mucous membrane lying over it. (Fig. 3, Plate I.)

What has just been described is the appearance seen on section of that form of disease that tends to spread horizontally. We will now consider the disease when it forms more or less a distinct tumour. These tumours vary considerably in their consistency, some being so soft as to break down on the slightest pressure, while others are very firm. It will generally be found that the firmness of the tumour is in inverse proportion to the rapidity of its growth. Some of the rapid growing tumours are so fragile that they fall to pieces on the slightest manipulation. On section of the firmer growths bands of fibrous tissue can be distinctly seen by the naked eye. Such bands are scarcely visible in the softer growths. Between the branching fibrous bands of tissue the softer substance can be seen of a similar nature to the material described on page 58. Sometimes this softer material can be carefully unravelled with a needle, and then is found to consist of exceedingly fine threads, looking much like vermicelli closely coiled together. These threads are of a

uniform thickness, about one sixtieth of an inch in diameter, but often as much as an inch and a half in length. They appear to be villi that have grown to an enormous length, but close coiled upon themselves like hairs that have failed to pierce the cuticle; specimen No. 1221, Royal College of Surgeons, referred to (footnote on page 56), is a beautiful illustration of such a growth. It may be gathered from this sketch of the naked-eye appearances of adenoid rectal disease how different the appearance under the microscope would be according to the portion of the growth examined and the length of time it had been growing. Sections involving the older portions of the disease, and in which the adenoid growth had been destroyed by ulceration, would show little more than dense fibrous tissue, the result of a preceding active condition of disease, while sections from the margin would show the cellular growth, in varying stages of development towards adenoid structure, according to the rapidity of the growth.

In order to understand the appearances found in the morbid bowel it is desirable to trace the disease from its very commencement, and follow its progress step by step.

Unfortunately the cases are rare in which the

growth can be discovered at any early stage, and rarer still that opportunity is afforded for microscopic examination. There is no reason, however, to doubt but that the condition of the tissue found towards the advancing margin of the disease would supply good evidence of the condition we should have expected to have found at the precise spot where the disease commenced. In support of this view I have by me a specimen in which the disease only existed a few weeks, and its section has much the same appearance as seen in sections cut near the border of more advanced disease. In this specimen the disease had not advanced further than the development of a portion of mucous membrane, a quarter of an inch in diameter, into a villous-like structure, while the subjacent retiform tissue is considerably thickened and crowded with lymphoid cells, the muscular coat being normal. The evidence afforded by this specimen, together with others at a more advanced stage, shows that the morbid action commences in an increased activity of growth in a portion of the mucous membrane.

Having briefly considered the naked-eye appearances of the growth, the use of the microscope is necessary for its further elucida-

tion. Satisfactorily to understand the position of the growth relative to the natural structures of the part, the composition of its elements, and its method of extension, it is necessary to examine many sections cut from different portions of the morbid mass. The appearances presented by such sections will vary greatly, not only according to the portion of the growth from which the section has been cut, but also according to the variety of adenoid disease from which it has been selected.

The drawings illustrative of this portion of the subject are from sections chosen from many thousands cut from different portions of sixty separate specimens. I have taken every care to draw the specimens exactly as they appeared in the field of the microscope. The drawings have been lithographed by Messrs Mintern Brothers, the excellence of whose work is well known to all members of the Pathological Society.

Fig. 3, Plate III, represents a section of the lamina form of disease. It has been cut at right angles to the bowel cavity, close to the margin of the growth, before the superjacent mucous membrane had been destroyed by ulceration. The section displays the mucous mem-

brane and the new adenoid growth in the submucous tissue. The follicles in this portion of mucous membrane are three or four times their normal length. Their diameter, however, is but slightly increased, their lining epithelium is large, the boundary line between the cells being very clearly defined. The bed of retiform tissue upon which the blind extremities of the follicles rest is enormously increased in thickness, and it is in this bed of tissue that the new adenoid growth is apparent, but, as seen in the figure, there is considerable distance between the bases of the normal follicles and the new glandular growth, the intervening space being crowded with a mass of small cells. There is no clear line of demarcation between the lymphoid cells of the submucous tissue and the new adenoid growth. At the upper portion of the section the submucous tissue appears crowded with the simple lymphoid cells; in the lower portion most beautiful glandular tissue can be seen almost as perfect in its formation as the normal Lieberkühn's follicles. The change from the lymphoid cells to the gland tissue is by imperceptible degrees. If the lymphoid cells be followed downwards towards the growth, they appear as if they slowly change their character

from a simple lymphoid into an epithelial type of cell. It looks, indeed, very much as if the small lymph cells gradually surrounded themselves with protoplasm, and thus became the nuclei of epithelial cells. Anyhow, the more nearly they approach the growth the more epithelial is their character. Almost immediately after the epithelial type of cell can be recognised small embryonic-looking portions of gland tissue can be seen. These little bits often consist of four or five embryonic-looking epithelial cells arranged in a cluster. At first the acini are difficult to make out, owing to their being irregular and indistinctly marked, but they gradually merge into the perfect and regular adenoid structure seen in the plate.

This adenoid tissue, as seen on section (Plate III, fig. 3), consists of a series of cavities divided from one another by fibrous tissue (Plate IV, figs. 1, 2). In some places the fibres of this tissue are close together, forming dense bands. In other places they open out, forming a loose retiform tissue. The cavities vary in shape from perfect circles to long irregular channels with various inlets. These spaces are lined with a single layer of epithelial cells. The bases of these cells rest

upon the fibrous or retiform tissue before mentioned, while their apices look into the cavity. Cavities, however, do not always exist; they are exceptional, for it seems that the apices of the cells covering one wall of the cavity are in contact with the apices of those of the opposite side, and it thus appears as if the cavity had been obliterated by external pressure.

In some of the spaces the villous-like offshoots can be seen projecting into the cavity from the epithelial boundary. These offshoots frequently show a beautiful tree-like arrangement, the original stalk throwing off secondary and tertiary branches, the stalk and branches consisting of retiform tissue, the whole of the surface being covered with beautifully regular epithelium (Plate IV, figs. 1, 2). In this way the interior of many of these cavities is completely filled with adenoid tissue. However complicated be the pattern formed by the crowding together of these branches or convolutions, every branch, whether it be primary, secondary, or tertiary, will consist of its central branch, upon which the epithelium is arranged in a bipenniform manner, *i.e.* bipenniform as seen on section, for if the whole thickness of the branch could be seen it would, of course, be entirely surrounded

by epithelium. The central stalk can always be traced backwards through the most complicated convolutions, and proved to be in direct continuity with the general fibrous stroma of the tissue surrounding the cavity. In order to understand the fibrous element forming the retiform tissue and intersecting bands, it is better to examine sections of that form of morbid growth that is extending as a tumour with a free surface projecting into the bowel cavity.

In such a section as Plate V, fig. 1, it is seen that the free surface of the tumour consists of a single layer of epithelial cells, their bases resting upon a network of retiform tissue. This consists of an exceedingly fine network containing lymphoid cells. As this network is traced away from the surface towards the deeper portion of the growth, fibres, which first formed a rough hexagonal kind of network, gradually converge towards each other, forming oblong meshes, and eventually converge together, and form in different places well-marked bands of fibrous tissue (Plate II (A), figs. 1, 2) which again form the boundaries of large spaces filled with adenoid growth (Plate IV, fig. 1). Here and there a band of these fibres appears again to

radiate into a retiform plexus, which is seen crowded with cells; the fibres, however, soon once more contract to a mere band of tissue. To make this description more intelligible it may be stated that if a well-marked fibrous band from the deeper portion of the growth be traced towards the surface, that it would have much the appearance of a birch rod, the twigs of which radiated upwards, enclosing the lymph-like cells of the subepithelial tissue (Plate II (A), figs. 1, 2).

In some of these bands each fibre appears to be in close contact with its neighbour, no appreciable space existing between them. Here and there, however, a distinct lymph path can be seen crowded with lymph-cells. Of course, it must be remembered that this description is taken from an exceedingly thin section, and what appears under the microscope to be distinct fibres may be merely the thin walls of channels cut longitudinally, vertically, and obliquely, thus causing the appearance of the network alluded to.

If a section be cut from the deeper portion of the tumour it does not differ materially from one taken from the surface, with the exception of the greater width and increased number of

the fibrous bands alluded to, and it may be here remarked that these fibrous bands forming trabeculæ enclosing masses of adenoid tissue, are especially developed as the new growth invades the deeper structures; and above all they are conspicuous when the growth has invaded the neighbourhood of the muscular coats, in which position they represent the natural inter-muscular fibrous bands greatly hypertrophied. In the projecting form of tumour these bands are, comparatively speaking, feebly marked.

Lining Epithelium

The character of the epithelium found lining the acini of the tumour or covering its free surface will now be considered (a high power, No. 9 or 12 Hartnack, should be used). Its appearance varies greatly in different portions of the growth. In some places the cells are nearly round, in others they are like narrow tubes, their length being fifteen or twenty times their diameter. Plate II represents some of the varieties. Figs. 1 to 8 are drawn from cells covering the surface of the growth, while figs. 9 to 19 represent cells found lining some of the

deeper cavities. In some of the cells no nuclei can be seen, while in others many are present. In the long cells found covering the surface of a chronic growth it is almost impossible to obtain sections cut in the true axis of their length, for in almost all the sections they are cut more or less obliquely. Notwithstanding this difficulty in tracing a single cell from apex to base, I believe that I have clearly seen three or four nuclei in each of these cylinders or cells. The nuclei are equidistant apart, the first being near the base, the last near the apex. The cell wall opposite each nuclei is bulged outwards, and the nuclei of contiguous cells are arranged in such a way that the bulging portion of one cell fits into the depression between two of the nuclei of its neighbour's (Plate II, figs. 5, 8). The nuclei all have an oval form, their long axis being parallel with the long axis of the cylinder. These nuclei in size and shape closely resemble the lymphoid cells of the retiform tissue. At times, indeed, it is difficult to distinguish whether the body be still a nuclei in the base of an epithelial cell, or whether it should be regarded as a lymphoid body of the retiform tissue. Fig. 4 represents another form of cell. It is exceedingly narrow at its base, while the

apex bulges out, and contains the nucleus. Fig. 7 represents what at first appears to be a cluster of cells with narrow stalks and dilated apices, but, as mentioned on page 82, it is more probable that these are young cells budding off at the apex of a parent. Figs. 9, 10 are large oval cells, containing many dark masses that look like nuclei. These are never found on the surface only in the lining of the deeper gland tissue. Some of the cells found near the margin of the advancing adenoid tissue have a very characteristic appearance. It would seem as if they had a distinct cell wall, while the contained protoplasm seems to mass itself together at one portion of the circumference, while the rest of the cell is occupied by a thinner fluid, or sometimes the protoplasm seems to be spread out like a thin ring around the inner surface of the cell wall. Sometimes, again, the contained protoplasm appears to have split up into several distinct masses, each of which forms a new cell, which undergoes vacuolation like the original parent. This is very similar to the process observed by Strasburger in the cells of the spirogyra. In speaking of and describing the cells, especially the long cylinders found on the surface, attention must be drawn to the

impossibility of regarding them as individuals having a separate existence, at any rate, at the stage of their life when they help to form the structure of a stable tissue, for each cell is dependent upon its immediate neighbour, one wall being common to two cells. The long cells when cut across present a beautiful hexagonal network, the contents having fallen out in preparation. This network is, of course, a portion of the cell wall. Whatever might have been the composition of the cell wall during life, there can be no doubt whatever that, after preparation for the microscope, the cell element differentiates into two constituents, a firm external wall, and a softer contents easily displaced by manipulation.

The question of the origin of the fibrous tissue playing such an important part in the structure of the new growth is one of the greatest interest. It seems clear that in a growing tumour a cellular structure precedes the fibrous. The question to be solved, therefore, is whether the fibrous tissue subsequently found in the tumour is the result of the metamorphosis of the pre-existing cells, or whether it is to be regarded as a prolongation or extension upwards of the fibrous tissue natural to

the parts in which the tumour is situated. My belief is that the evidence afforded by the microscope is in favour of the former view.

Evidence to show that the Fibrous Tissue is developed from the Cell Walls

It is difficult in any given portion of a morbid growth to trace out the connection between the cell element and the fibrous tissue, for the stages of the growth of the fibrous tissue have passed away, and a more or less perfectly formed tissue, the result of pre-existing conditions, alone remains.

On the margin of a growing tumour, or in the normal tissue growing more actively than usual in its immediate neighbourhood, a definite relation can be traced between the cell growth and fibrous-tissue formation, and it might fairly be inferred that the fibrous element in the tumour itself had been produced by a similar process.

The large epithelial cells lining the acini of an adenoid tumour, or the still larger cells lining the hypertrophied mucous follicles in the immediate neighbourhood of the growth, afford much facility for studying the apparent formation of the intercellular fibrous tissue (Plate XI, fig. 2).

In an ordinary longitudinal section of a follicle it appears as if the base of the epithelial cells rested upon a layer of basement membrane, and that they (the cells) were kept in place merely by the adhesion of their bases to the membrane. The appearance of this membrane is a mere delusion, and is probably due to the manner in which the section is cut or prepared, and at any rate it can be often demonstrated in exceedingly fine sections that no such membrane exists, and that the cells are in reality much more intimately connected with the interfollicular tissue.

If a section be taken through the columnar cells at right angles to their long diameter, close to their apices, the lines of demarcation between the individual cells appear like a fine network of hexagonal form. This hexagonal form must inevitably be the shape assumed by soft cylinders in contact when subjected to pressure; fig. 20 shows this network.

Now, if another cross section be taken so as to cut the cells across about the middle, the network will have become much thicker (fig. 21), and its outline will be rather of a circular than an hexagonal form.

If a third section (figs. 22, 23) be cut close to

the base of the cells, the relative size between the network and the spaces will be seen to be more in favour of the network. In this third section small lymphoid cells will be seen in the substance of the material forming this network.

Now, the network seen in these three sections must either be formed from the protoplasm of the epithelial cells, or by an extension upwards between them of the fibrous element of the subjacent tissue, but it can hardly be doubted that the fine lines described as seen in the first section were due to the thickened outline of the protoplasm of the cells, for the same appearance can be seen in almost every simple cellular effusion. If this be conceded then it must be evident that the lines in both the second and third sections, since they are in direct continuity with the first, must be due to an increase in the thickness of the zone of darker protoplasm on the outline of the cell.

Notice must here be taken that the original hexagonal network does not undergo an equal thickening in all its parts, for it is at the angle of the hexagons that the greatest thickening takes place, and it is to this cause that the spaces assume a circular form. Now, it must

not be supposed that either the hexagons or the circles have a mathematical accuracy, far from it, for their shapes are often very irregular; but still, as a whole, they assume more or less the forms indicated.

It will be at once seen that this network, which will for the sake of expediency be called intercellular, will, when seen on cross section, have all the appearance of a series of the so-called stellate cells, the processes of which anastomose with one another. In figs. 24, 25, will be seen the stages of transformation by which the appearance of a stellate cell may be arrived at, the stellate processes being formed from parts of the circumference of as many pre-existing cells (see fig. 26). So far, the network we have described has little appearance of being a fibrous structure; it seems to be a homogeneous granular material, protoplasm, in fact.

A section should now be taken through the cells in the direction of their long axis, the section extending into the adjacent retiform tissue (Plate II (A), figs. 3, 4). The lines between the cells will exactly account for what was seen on cross section, for commencing as mere lines between the cells, towards their apices they

gradually widen out towards the base, and are in direct continuity with the fibres of the retiform tissue. The composition of the line between the cells appears to be a homogeneous granular material, but as it is traced into the retiform tissue assumes a distinctly fibrous appearance.

In some portions of rapidly increasing growths some of the cells appear to become enlarged and undergo a process of vacuolation, the external portion or cell wall forming in conjunction with its neighbours the fibrous elements of the tissue, while the interior of the cells, by absorption of the intervening wall, become channels. In recently formed retiform tissue the wavy or crescentic forms of the fibrous bands appear to be the result of its formation from the outline of the cells (Plate II, fig. 27). The triangular and quadrilateral bodies so commonly seen in new tissue are the result of three or four crescentic segments of cells that have adhered back to back.

CHAPTER IV

METHOD OF EXTENSION

It is proposed in this chapter to consider the manner in which the growth increases in bulk. Since the plan by which the growth extends into the deeper tissues, and that by which it increases on its free surface, may not be entirely similar, it will be well to consider them separately. The process is more easily traced on the free surface; it will be, therefore, first described. Before making an examination by means of sections the appearance of the surface of the growth will be examined.

A small portion of the surface should be placed under spirit, and have a strong light thrown upon it, and be examined by a half-inch object glass. At first sight the specimen reminds one of an ant hill closely covered by an infinite number of fungi. Upon closer scrutiny it will be seen that these fungus-

looking bodies are projections from the surface of the tumour; some of them are mere blunt-pointed spikes like asparagus; others, again, are broad, very thin leaf-like processes (Plate VI, fig. 2). Some of these broad processes show a tendency to curl, so that one surface becomes concave and the other convex. This curling process can be traced through many degrees, from the slightest curl to a time when the opposite borders come into contact in such a way that if the point had not curled in at the same time a cylinder open at the top would have been produced. In some processes the border curls upon itself like a dried-up leaf. In others, at one or more lines along their surface, little ridges appear, which in time become secondary broad leaves, which after a while behave in a similar manner to the primary ones. These secondary processes always appear on the concave side of the parent leaf. Thus they often become enclosed by its advancing border, as shown in Plate VII, figs. 1 to 9. Secondary offshoots, as just mentioned, throw off tertiary projections, so that ultimately an exceedingly intricate pattern is produced. Here and there in a specimen some of the projections can be seen accidentally cut or knocked

off, and in these the structure becomes evident. Each leaf is composed of a thin layer of retiform tissue, upon the borders of each side of which grows a single layer of cylindrical epithelium. The appearance of these processes when seen in section closely resembles a jam roll, the epithelium representing the pastry, the retiform tissue the jam.

In order to establish with certainty this method of extension by constant involution, sections must be cut both at right angles to the tumour and parallel with it (Plate V, figs. 1, 2). It must be borne in mind that the drawings were taken from thin slices only, so that the pointed tips of the processes do not necessarily represent villous-like projections, but should be rather regarded as sections of long leaves or ridges of tissue. This being understood, the method of growth becomes evident. The free margin of a section is formed by a single layer of columnar epithelium resting upon a base of retiform tissue. The outline of the free surface of the tumour is irregular to the greatest degree, and is formed by a series of tree-like processes, some of which shoot out far beyond their neighbours. The apices of these processes, together with their lateral offshoots

become convoluted, and, bending over, come into contact with one another, or with similar processes from neighbouring projections. In this way cavities are formed; such cavities do not long remain, but are encroached upon and soon filled by offshoots from their walls. We are now enabled to read the explanation of the cavities lined by epithelium found in the deeper portions of the tumour, for this epithelium, which we find enclosed, and entirely surrounded by retiform or fibrous tissue, was in reality, at an earlier stage of the growth, a portion of the epithelium covering the surface. The process, indeed, is analogous to that by which the mesoblast cuts off and encloses a portion of the epiblast to form the spinal cord and brain. Plate VI, fig. 2, is drawn from a beautiful specimen cut from the free surface of an advancing tumour. In this specimen the method by which the cavities are formed by involution from the surface can be readily followed. Plate VII, figs. 1 to 9, are partly diagrammatic, to show the various stages of growth.

In order to study the method by which the epithelial margin grows, a high power, No. 9 Hartnack, is advisable. On examining a section of the epithelium, it will be found that at

one or more points two or three epithelial cells are outstripping their neighbours by growth in their long axis, so that they become of greater length than their neighbours. At the same time it may be noticed that these lengthened cells are undergoing multiplication by cleavage at their extremities, as represented in Plate III, fig. 2 *a a*.

As the new cells are progressively formed they bend over at right angles to the direction of the line between the original cells. By this process the extremities of the primary cells become club-shaped by the growth of the young epithelium. By an extension of this cleavage process a new outgrowth is produced (Plate VII, letters *a, b, c, d, e*).

The central lymph space is formed as follows:—The line of junction between the original cells becomes more prominent and clearly defined, and appears like a narrow column of protoplasm, upon each side of which the growing epithelium is arranged, and from this central column processes extend at right angles between the individual cells. Small dark masses soon appear within the primary column, and as they become vacuolated the column gradually assumes the appearance of retiform tissue.

Now, having considered the foregoing phenomena, as seen on the surface of the growth, there would appear to be little difficulty in conceiving how a tumour could be formed by a constant extension of the epithelial border covering the surface of the mucous membrane. Analogy would suggest that the method by which the tumour extended into and invaded the deeper structures would be after a similar manner.

Pathologists have often maintained that, whereas the villous tumour is an extension of the epithelium towards the free surface, that epithelioma is due to a similar extension of the epithelium downwards. I must, however, at once confess that, after an examination of a very large number of sections cut at right angles to the mucous surface, I have been unable to satisfy myself that proof exists of extension downwards by direct continuity. In all the specimens examined, a layer of simple lymphoid tissue, of more or less thickness, existed between the bases of the normal follicles of the mucous membrane and the subjacent adenoid growth.

This, of course, is not conclusive evidence that no such continuity existed; for the downward growth might have started from a

small portion of the mucous membrane, and then have spread in a horizontal direction, like an inverted mushroom. Again, if the tumour extended by a constant aggression of its epithelial border upon the surrounding structures, we should expect to find the boundary of the tumour marked by a distinct epithelial border, or at any rate some line of demarcation between the adenoid tissue of the growth and the neighbouring structures, but the microscope fails to show any such boundary. If a section be cut involving a portion of the tumour and a portion of the tissue in which it is embedded (see Plate III, fig. 3), at one end of the section perfect gland tissue can be seen, while at the other the muscular or fibrous tissue natural to the part is visible in an apparently healthy condition; but as we trace the healthy tissues towards the adenoid growth the following changes can be seen :—Small lymphoid cells make their appearance between the fibres of the normal tissue; they are often so crowded together as to form distinct masses, which expand the fibres of the tissues in which they are contained, so that it becomes many times its normal thickness. As we approach nearer the growth these cells, or a portion of them, appear

by imperceptible degrees to change their character from a simple lymphoid into an epithelial type, for it seems as if each lymphoid body surrounded itself with protoplasm, of which it remained the nucleus.

At first the epithelial cell is nearly all nucleus surrounded by merely the thinnest zone of protoplasm, but the nearer they approach to the adenoid tissue the greater is the proportion of the protoplasmic surrounding, until in the immediate neighbourhood of the growth well-marked epithelial cells are apparent. The epithelial cells can be seen here and there to be arranged in little bundles round a central space, and almost immediately afterwards detached portions of ill-marked gland tissue can be seen, which in their turn give place to the more perfect gland structure.

The source from which these differentiating cells originate is a matter for consideration, for they might be either young elements, the offspring of the epithelial margin of the advancing gland tissue, becoming formed in the likeness of their parent, or they might be cells derived from a different source, but coming under the same specific influence.

In whatever direction the growth be traced,

except on the free surface, the same kind of change can be seen, and its advance is marked by an extensive infiltration of lymphoid cells between the fibres of the part. The gradual transition from the lymphoid into the epithelial type of cell can be more clearly seen as the growth approaches the fatty tissue. Plate VI, fig. 1, are drawings taken from a specimen removed during life by Mr Morrant Baker. It will be at once seen how much thickened are the trabeculæ in which the fat is contained, while the interstices of the fibrous tissue forming this trabeculæ are crowded with lymphoid cells. These lymphoid cells advance from the trabeculæ, and appear within the fine spaces or lines that separate the individual fat-cells. By an extension of this process each fat-cell becomes completely surrounded by a simple layer of lymph-corpuscles. These lymph-cells appear gradually to lose their lymphoid type, and assume an epithelial appearance, as seen in Plate VIII, fig. 2. In this plate the tissue shows a number of spaces surrounded by an epithelial type of cells. The spaces indicate the site occupied by the original fat-cells.

It would appear, therefore, as if there was at least one other method by which the tumour

encroaches upon the neighbouring structures than by the direct extension of its epithelial border, and that this extension is by no means the gradual conversion of the cloud of small cells that form the advanced guard of the tumour into glandular tissue.

Now, it may be asked whether the foregoing description applies equally to the rapid growing malignant adenoid disease running its course in a few months, and to the more chronic adenoid growths that may be many years in progress without producing much evil. I would answer that the plan and structure of the growth is similar, but the more rapid is the growth the less perfect and complete is its structure. If, for instance, under a low power we examine a section, such as is seen in Plate IX, fig. 2, which was a rapidly recurrent tumour that had attained a considerable size in a few weeks, we can there trace the whole outline of an adenoid growth; the various convolutions can be made out, the epithelial, fibrous, and retiform tissues can all be seen in their relative situations, but yet nothing is distinct or clearly defined, and it looks as if the specimen was seen through a thin veil. Upon examining the minute structure under a higher power the want of definite

formation becomes still more apparent, for instead of the epithelial lining showing well-marked cells, it has rather the appearance of a band of darkly stained protoplasm, indistinctly striated at right angles to its length and well sprinkled with nuclei (Plate X, fig. 2). If we examine the tissue lying between these vaguely marked epithelial cells, instead of the retiform and fibrous tissue of the more chronic growth, we find embryonic-looking oat-shaped fibrous-tissue cells with little or no definitely formed fibrous tissue. An appearance exactly similar to the so-called spindle-cell sarcoma is produced, but the identity of this sarcomatous-looking material with true retiform or fibrous tissue is established, beyond doubt, by following a track of it in the direction of the base of the growth, where its real nature gradually becomes apparent as it merges into well-marked fibrous tissue.

Not uncommonly in a single growth may various degrees of development of the adenoid tissue be found, from portions so embryonic as scarcely to be recognisable to others in which well-marked glandular or villous tissue is apparent. Again, a growth which upon its first removal showed well-formed glandular

structure, upon its recurrence often shows a tissue of a much more embryonic nature. The following case may be mentioned as an example: —Early in 1878 I removed a portion of rectum, two inches and a half in length, and in width three quarters of the circumference of the bowel, a narrow strip of mucous membrane, about three quarters of an inch in width, being left opposite the recto-vaginal septum. This portion seemed, for the time, to be free from disease. The woman made a good recovery, and left the hospital well in five weeks. She came to my out-patient room once in every fortnight, on which occasions the bowel was carefully examined. All seemed well for the first three months. She then complained of a slight irritation of the part. Upon examination, at a spot on the strip of the mucous membrane that had been left the membrane looked rather more vascular than normal, and seemed to be slightly raised above the surrounding level. Incautiously something was said about a further operation being necessary, and the patient, a nervous woman, ceased to attend for six weeks. She then attended again, frightened by passing blood with her motions. I found at the spot that had previously looked suspi-

cious a beautifully round papillary growth, about the size of a large pea. It projected into the rectal cavity and felt soft, but when taken between the finger and the thumb could be felt to have somewhat of a hard base. The little growth, including its base, was seized by a pair of vulsellum forceps, drawn down, and cut off with scissors. The wound healed quickly. The patient remained perfectly well for fourteen months; at that time she felt no pain, but her attention was again drawn to the part by a little blood in her motions. I found that the blood proceeded from a minute speck of red granulation-looking material, certainly not larger than a millet seed, which projected through a tiny hole in the cicatrix that was left by the second operation. By placing the thumb in the vagina and the forefinger in the rectum a little tumour, less than a quarter of an inch in diameter, could be distinctly felt in the recto-vaginal septum. The mucous membrane of the vagina was freely movable over the nodule, but it was firmly connected with the cicatrix on the rectal surface. This tumour was also removed, and the patient is now well. To distinguish the specimens thus removed we will call them 1, 2, and 3, in the order of their removal.

No. 1 was a typical specimen of horizontal adenoid disease, several square inches of the bowel being affected. Drawings from this growth will be seen in Plate III, fig. 3; also Plate X, fig. 1.

Specimen No. 2 is a beautiful example of a papilloma, portions of the specimen being figured in Plate V, fig. 1; also Plate XI, fig. 1.

Specimen No. 3, when the little tumour was cut in two, showed signs of softening in its centre, and the growth that remained, including the little portion projecting into the bowel cavity, was a good specimen of the embryonic adenoid growth (Plate IX, fig. 2).

CHAPTER V

DIAGNOSIS

Few diseases commence in a more insidious manner than malignant disease of the rectum. It is always difficult, and, in many instances, quite impossible, to obtain exact data as to the duration of the symptoms; nor is this a matter of surprise if the nature of the disease be considered. At one time a patient is absolutely healthy, at a later period as certainly diseased; the gradations between the two are by exceedingly fine degrees.

The earliest symptom of malignant, as in many other diseases of the rectum, is the consciousness of the patient that he possesses such a portion of the body. There is just sufficient uneasiness about the part to excite the imagination from time to time, this uneasiness seldom at first amounting to such distinct pain as to make the patient aware that there is anything actually wrong; sometimes there is merely a

sensation of itching about the anus. As the disease advances symptoms of a more definite character make their appearance; these symptoms are very varied. Speaking generally, and in typical cases, the discomfort gradually increases to a dull, heavy pain, especially noticed after exercise and at night. The fæces become streaked with blood or covered with a white slimy matter; diarrhœa frequently alternates with periods of constipation. As time goes on the sufferer notices that the motions can only be passed by much straining, and with pain, while they are small in diameter or more or less flattened and ribband-shaped. The anus is excoriated, although not always, and the linen is stained with a dark, offensive discharge. The patient has a constant feeling of the bowels being full and requiring evacuation. At times there is considerable tenesmus, the frequent calls to stool resulting in a blood-stained purulent discharge. The patient begins now rapidly to emaciate, the pain becoming more constant and often giving rise to intolerable agony. Sleep is only obtained by opiates. Secondary symptoms may begin to develop themselves; the digestion is impaired; the legs swell; the liver, perhaps, becomes large and nodular from

secondary affection. The patient gets worse, and gradually dies of exhaustion, worn out by pain and bleeding, or the fatal termination may be more abrupt by an attack of acute peritonitis, or not unfrequently by the coming on of complete intestinal obstruction.

To illustrate such a series of symptoms the notes of the following cases under my care may be of value.

Case 1 (for the notes of which I am indebted to Mr Gillam, our house-surgeon).—A. H—, admitted into the Great Northern Hospital early in 1877. No family history of phthisis or tumours. He had been a healthy man up to two years ago. At that time he first noticed an uneasy sensation about the rectum. This sensation scarcely amounted to pain, except occasionally on the passage of a constipated motion. After these sensations had existed some months, the patient noticed for the first time a little blood in the fæces. His linen also was occasionally blood-stained. At this time he consulted a doctor, and was treated for piles, but the symptoms remained nearly the same during the next twelve months. He then thinks that he caught cold; anyhow, the symptoms became, on a sudden, considerably aggra-

vated. He suffered so much pain as to be kept awake at night, and had a good deal of diarrhœa. About a week after this attack he had a good deal of offensive blood-stained, mucous discharge, but with this discharge the pain became less. The discharge has continued ever since, but only in moderate quantity. For the last six months he has had considerable trouble with his motions and has taken much purgative medicine. The motions have been getting smaller, being scarcely thicker than the little finger, and always passed with difficulty. On admission into the hospital he was weak and much emaciated, with a sallow, jaundiced appearance. He complained much of a burning pain in the region of the coccyx; this was always worse at night, depriving him of sleep. There was only a small amount of discharge from the anus. For two or three consecutive days he would complain little of pain during the day. At other times he would suffer more, and be much tormented with a constant desire to stool. The pain was not aggravated on passing a motion, after which, indeed, he often obtained relief.

Upon examination a considerable amount of œdema existed over the sacral region, and

pressure on this spot caused pain. The liver was not noticed to be enlarged, nor did it feel nodular, but three months later it could be distinctly felt to be both enlarged and nodular. There were two very small, slightly œdematous folds of skin about the anus, otherwise it appeared healthy. On passing the finger into the bowel it felt healthy for about an inch and a half, then became harder than natural, and a distinct lump could be felt projecting under the mucous membrane of the posterior wall. It appeared at first as if about three and a half inches from the anus the bowel ended in a cul-de-sac, but upon a little manipulation the tip of the finger could just enter a tight annular stricture, which appeared to extend upward some distance. The bowel was evidently firmly adherent to the surrounding tissues; the tip of the finger in the stricture was unable to get any movement. The patient lingered at the hospital for some months, gradually growing weaker. He was one night seized with sudden severe abdominal pain, which in a few hours terminated in fatal collapse.

The post mortem was performed forty-eight hours after death. Body thin and emaciated; the blood in vessels not coagulated; belly much

enlarged and tympanitic. Upon opening the belly a large quantity of purulent fluid escaped. The bladder, being adherent to the anterior wall, was opened, and was full of urine; the whole of the right and left hypochondriac regions were occupied by the liver, which presented a mottled appearance, being thickly studded over the surface with hard white masses about the size of threepenny pieces. Upon the liver being removed and cut into, nodules were seen pretty equally distributed over the left side, each being about the size of a pea or bean. On the opposite or right side were three large white patches instead of the smaller deposits found on the left, the largest patch being two and a half inches in diameter. These had at their margins a stellate appearance, due to white bands radiating a short distance into the healthy structure; the centre of these masses was of a soft consistency, the interior of the larger patch being like thick cream. The liver weighed seven and a half pounds, it was in no place adherent to the parietal layer of the peritoneum, and it appeared as if this membrane had resisted the advance of the disease. The gall-bladder was distended with bile, the spleen and kidneys

were free from disease, but the pancreas was affected with nodules much in the same manner as the liver. The whole chain of lumbar glands was infected, many of them being the size of a hen's egg. The intestines were apparently free from disease except at a spot situated four inches from the anus, at this point the intestine became quite suddenly constricted. This constriction felt like a tight ring outside the mucous membrane; this was the stricture felt during life. With firm pressure the constriction would admit the tip of the finger, the bowel both above and below the stricture was sound with the exception of a slight constriction opposite the prostate, and two minute specks of cancer material under the peritoneal coat just above the constriction. The bowel was greatly distended above the strictured portion and full of soft fæces, but no ulceration could be detected in it. A further examination of the seat of stricture showed that the constriction was caused by a deposit of cancerous material, one eighth of an inch thick and a quarter of an inch broad, just at the line of the recto-vesicular fold of the peritoneum. This band extended half round the bowel. A tight portion of fibrous tissue occupied the

remaining half of the bowel circumference, and was continuous at each end with the line of cancer. Indeed, it appeared as if some of the fibres of the fibrous tissue, that here encircle the bowel, were continued into the cancer line, and that the contraction of the cancerous portion had caused the tightening of the fibrous band.

The deposit of cancer was beneath the mucous coat of the bowel, involving the submucous and muscular coats. Upon putting the finger into the cul-de-sac between the rectum and bladder from the opened abdomen, the peritoneum passed over the deposit, just described, with quite a smooth surface. Behind the rectum, between it and the sacrum, but not adherent to the wall of the bowel, was a mass of cancer as large as an orange, softened in the centre to almost creamy consistency. This mass had caused the absorption of a considerable portion of the coccyx and lower part of the sacrum. It appeared as if this mass sprang from one of the lower coccygeal glands. In many of the veins of the part little hard nodules could be felt, the size of millet seeds; these were quite free in the veins and dropped out when the veins were opened. Upon

further examination they proved to be only calcareous oval bodies.

Case 2.—Jane W—, æt. 42, a well-developed, tall woman, with a good family history. She had the appearance in the face of some suffering, but was not much emaciated. Eighteen months ago she noticed pain in the back, about the lumbar region. She had no other symptom until a year ago, when she first noticed a slight discharge of blood, but she suffered no pain or uneasiness. Seven months ago she first had local pain, but this only during and after defecation. After a few weeks the pain became continuous, especially bad at nights, compelling her to walk about the room for hours. Three months ago a fetid sanguineous purulent discharge came on. After the onset of this discharge the pain became a great deal less. She has lost blood for six months from the rectum; slight at first, more of late, but never profuse. Has had little diarrhœa. The purulent discharge, which soon after its first onset was very diffuse, has been much less of late.

Upon examination a growth of firm consistency, the size of a large nut, was seen springing from the mucous membrane just within the anus. Upon introducing the finger

within the bowel, the rectal wall, especially the anterior portion, felt hard and irregular, with some ulceration in places, and was more like a semi-rigid tube than a contractile canal. As far as the finger could reach, the bowel was thickly sprinkled over with hard nodules, from a sixth to a quarter of an inch in diameter.

The rectum, notwithstanding its nodular rigid condition, was fairly movable upon the surrounding parts. On a further careful examination under chloroform it was found impossible to ascertain the limits of the disease; no operation was thought advisable. She continued to attend as an out-patient for the next two months, obtaining great relief by using, night and morning, warm injections of starch and opium (thin fluid starch ℥j, Liq. Opii sed. ♏xx). The patient became gradually weaker and died, I believe, about four months after she was first examined at the hospital.

Perhaps it will be well to consider in a little more detail the various symptoms mentioned.

Pain is of such common occurrence in all rectal disorders that it only becomes a valuable adjunct to the diagnosis when in conjunction with more definite symptoms. It is seldom an early symptom, being commonly the result of

the morbid changes in an advanced stage of the disease, for at first discomfort merely is experienced, especially after walking or sitting long in a constrained position. There is often an uncomfortable feeling of wanting to stool, yet upon trial nothing but a little mucus is passed. As the disease advances the pain increases. So far as my experience goes the amount of pain greatly depends upon the situation of the disease. When situated at the anal margin or opposite the prostate the suffering is much greater than when situated higher up the bowel, in which situation it has more room to expand. Sometimes when situated high up the bowel scarcely any pain is felt until quite late in the disease. The sharp, burning pain complained of during and after the passage of a motion is due to the irritation of the tender ulcerated surface. Not unfrequently, as recorded in Case No. 1, a dull, aching pain, more or less constant, is referred to the lumbar or sacral region. This pain is often rather relieved than aggravated by the passage of fæces. It is due to the direct pressure by the disease on the nerves lying between it and the sacrum. In the case recorded (Case No. 1) actual absorption of a considerable portion of the sacrum had resulted

from this pressure. As already noticed, the onset of pain is generally gradual, but it not infrequently happens that a somewhat sudden aggravation of the pain occurs, followed in a few days by a copious muco-purulent discharge which greatly relieves the patient. There can be no doubt that this acceleration is due to accidental inflammation of the parts in the neighbourhood of the disease, and is often accompanied by a rise in the temperature. On the whole I am inclined to believe that the accounts given of the pain suffered in rectal cancer are much exaggerated, and is certainly not more severe than is often suffered in fissure or inflamed piles. I have more than once found considerable masses of cancer in patients who were quite unaware of the disease owing to having suffered scarcely any discomfort. Mr. Allingham, in his admirable work on rectal diseases, also mentions the fact of having met with cases of advanced disease in which the patients had scarcely suffered at all. If there is any tendency to inflammation about the growth the pain undoubtedly becomes severe. Under these circumstances the patient can scarcely bear examination, and the circular fibres of the bowel in the neighbourhood of the disease are

affected with considerable muscular spasm. Some patients, again, seem to have a natural anæsthenic condition of their whole nervous system, while others are naturally sensitive. Indeed, it is a fact constantly observed by all surgeons that no two patients appear to suffer in the same degree from similar diseases or injury.

Bleeding from the bowel is almost sure to take place at some period of the disease; it appears to depend upon two causes. In the early stage the blood comes from the congested mucous membrane lying over the disease, and is much increased by constipation, which retards the free return of venous blood. At a later period it may not only be due to this cause, but to actual ulceration of one of the hæmorrhoidal vessels. Cases are recorded in which the bleeding has been so alarmingly persistent as in itself to cause the death of the patient. Bleeding from the bowel when copious and persistent, and when not dependent upon hæmorrhoids, should always be looked upon with some suspicion. There are, however, many other conditions besides malignant disease which may give rise to the bleeding. As an instance, it may not be out of place to mention an exceedingly

interesting case, for the details of which I am indebted to my friend Mr. Edwards, late house-surgeon to St. Mark's Hospital.

A patient was admitted into St Mark's on account of hæmorrhage from the rectum. She had been very unwell, with vague pains about the abdomen, for some months. During the last few days she has had violent bleeding from the bowel. Soon after admission she had another violent attack of bleeding, from which she never rallied and died in a few hours. A post-mortem examination showed a small deep ulcer of the stomach which had opened into the gastric artery. She had vomited no blood, nor could any other lesion be found in the alimentary canal.

A somewhat similar case of profuse hæmorrhage from the bowel, the result of gastric ulceration, is mentioned in the catalogue of the Middlesex Hospital (series 8, No. 33), but in this case there was also hæmatemesis.

A *discharge* of a muco-purulent nature is seldom absent if the disease has existed any length of time. At first this is simple mucus, but becomes purulent after ulceration has taken place. From time to time this discharge is considerably augmented in quantity, while

at the same time it is more purulent in its nature. A day or two prior to this increase, the patient will complain of intense pain which is greatly relieved by the discharge. The explanation of this has been already mentioned. The discharge has a highly offensive odour, the peculiar odour being considered by some surgeons pathognomonic of the disease. Personally, I must confess to be unable to verify these assertions beyond the fact that all purulent discharges from this neighbourhood are very offensive.

The examination of this discharge under the microscope may be a considerable aid to the diagnosis in those cases in which the disease is beyond reach by the finger. The bulk of the solid particles found in the discharge consists of lymph or pus-cells with fæcal *débris*, but not infrequently little masses of the growth may be detected here and there, especially if the growth be of a soft friable nature. Such little portions can of course only be observed in a comparatively advanced stage of the disease after ulceration of the mucous membrane.

Diarrhœa is an intermittent symptom during the course of the disease. The sufferer often has a sensation as if he required to go to stool,

especially in the morning, and, after a little straining, passes a small quantity of fæces as well as some muco-purulent material. He does not feel, however, as if the bowel had been emptied, and may have recourse to the closet many times. On these occasions the discharge is more of a muco-purulent material than any true fæcal evacuation.

Constipation is a symptom of the utmost importance as a means of diagnosis if the disease be too high for digital detection. It may exist to almost any extent, from a slight trouble at the commencement of the disease to a grave complication as the disease advances; the motions being often small and narrow, or flattened, and only passed after doses of purgative medicine. Complete intestinal obstruction, a frequent complication of intestinal cancer, sometimes results from the blocking up of the intestinal canal by the gradual encroachment of the growth into its calibre. It is not rare, however, to find that the earliest symptom causing a suspicion of cancer of the large intestine is the sudden onset of complete obstruction. Such a case I had an opportunity of seeing this year in the practice of Mr Howard Marsh. The patient, a middle-aged

woman, was admitted into St Bartholomew's Hospital with symptoms of sudden obstruction. She stated that she had enjoyed good health up to the onset of the attack, nor had she previously been troubled with constipation. The attack commenced suddenly while at work, and was followed by obstinate vomiting and constipation. The symptoms having existed for some days, and the case appearing urgent, while the sudden onset of the symptoms suggested mechanical strangulation, it was deemed advisable to open the abdominal cavity. This being done, Mr Marsh felt a hard, cancerous mass in the walls of the bowel, which caused the obstruction. The bowel was opened above the obstruction, stitched to the side of the wound, the patient making a good recovery. The cancerous mass was not interfered with, so that the exact mechanism of the constriction was not elucidated. Now, at first sight, it does not appear easy to explain the sudden obstruction of the bowel by a cancerous mass within a few hours of its being completely pervious. Specimens in our pathological museums throw much light upon what is otherwise obscure. In Guy's Hospital Museum (Specimen No. 1887[75]) is a

specimen of adenoid cancer causing intussusception. In this case, a patch of adenoid disease affected a portion of the bowel, somewhat narrowing its calibre. The pressure of fæces above this had caused its invagination into the bowel immediately below, the intussusception producing complete obstruction. Many such specimens have been shown at the Pathological Society, and such a condition readily explains the sudden onset of obstruction without previous warning.

A very slight amount of such intussusception is sufficient to cause obstruction. In a case of a woman who died after colotomy, performed for sudden intestinal obstruction, at which I assisted in the post mortem at St Bartholomew's, a narrow ring of growth projected into the canal for about a quarter of an inch all round the circumference of the bowel. It looked like a diaphragm, the hole through its centre just admitting the little finger. The portion of bowel immediately below this diaphragm was considerably contracted, so that when the growth was pressed upon from above it passed a short distance into the narrow portion below, the opening through its centre being completely obliterated.

Another, although somewhat rarer condition, is sometimes found which will also account for sudden obstruction. In such a case a considerable dilatation forms above a slight annular stricture; after a time a pouch from this dilatation extends downwards below the level of the strictured portion of the gut. The collection of a hard lump of fæces in this pouch pressing upon a point below the stricture occludes the bowel, the margin of the strictured bowel being closed in a valve-like manner.

Breschet publishes a case of Talma's in which he describes such a condition causing obstruction. In this case nature had made a marvellous effort to remedy the defect. The dilated bowel above the contraction was put into connection with the part of the rectum situated below the contraction, a new canal having established itself between the two by the absorption of the adjoining walls, adhesions having formed between them.

The various symptoms just enumerated in detail are of the highest importance in calling attention to the probable existence of cancer, and have to be relied upon if the disease is in the sigmoid flexure or upper part of the rectum; but in the lower portion of

the bowel the diagnosis can be made sure by an ocular and digital examination.

In order to make a satisfactory digital examination it is essential to have the bowel empty. With this object the rectum should be thoroughly washed out with a warm water enema. The best position for an examination is to have the patient lying on his side with the knees drawn up. From four to five inches of the rectum can be examined by the finger, and if the patient be directed to strain and bear down a further length of bowel is brought within reach. The margin of the anus should be carefully scrutinised for any portion of growth that may be in sight. It sometimes happens that a fungating projection from the anus at once declares the nature of the disease. More frequently, however, the anus is normal, or merely slightly œdematous and red from the irritation of the discharge. Upon introducing the finger, the conditions of the part will depend upon the length of time the disease has existed, the portion of the bowel implicated, and the physical characters of the growth. Commonly a certain interval of healthy tissue exists between the anal margin and the lower border of the disease. Perhaps

the commonest point at which the disease is situated is at a distance from one to four inches from the anus. After this the disease is more frequently found just below the sigmoid flexure. The amount of bowel diseased varies from the smallest patch to the whole calibre for several inches, the extent being in almost direct proportion to the duration of the growth. If the examination be made at an early period an indurated portion of the bowel may be felt. This induration does not feel like a distinct tumour, but more like a thickening and hardening of the submucous tissue. The mucous membrane is generally pretty firmly adherent to the subjacent mass. The membrane is not ulcerated, but may feel somewhat irregular on its surface, being slightly raised in places while it is depressed in others. As a whole, however, the mucous membrane, pushed up by the growth, projects more or less into the bowel cavity. Now, as explained in the chapter on pathology, the disease appears to spread or extend after three or four different methods, the most frequent being its extension as a thin, firm layer between the muscular and mucous coats. At the time when this form of disease comes under clinical observation, more

or less extensive ulceration has occurred, and the finger can distinctly feel the firm base of an ulcer with abrupt, hard, overhanging margins, beyond which the disease apparently terminates somewhat abruptly in the healthy tissue. If the disease has extended so as to form a distinct tumour in the submucous tissue, the lump or lumps can be clearly felt projecting into the bowel cavity, or, again, a tight annular stricture, around which a hard deposit exists, indicates the disease. Sometimes, though more rarely, the rectum seems studded with hard, small nodules. If the disease be advanced, soft fungoid masses, blocking up the canal, may be felt; such masses bleed with the slightest irritation. When an annular stricture exists it is commonly just below the reflexion of the peritoneum.

This annular stricture is so common in malignant rectal disease that its structure requires special consideration. Sometimes it is due to a deposit of new growth in the submucous tissue around the entire circumference of the bowel. In such a case the mucous membrane may have given way and the growth protrude into the bowel all round. This, however, is not the common cause of the

stricture, which appears to be generally due to a deposit of cancer at one spot of the bowel, commencing in the submucous tissue and extending into the muscular coat, and as it does so incorporating into its substance the fibrous trabeculæ of the muscular coat. These fibrous trabeculæ naturally extend round the whole circumference of the bowel, so that, when they are drawn upon at one spot by the action of the growth, it has much the same effect upon the bowel as if it had been surrounded by a piece of string, the knot of which is being continually drawn tighter.

Colloid cancer in its physical characters differs in some respects from the foregoing description, owing to its soft, semi-fluid consistency. This disease is stated by some authorities to be the commonest form of malignant rectal disease. This is entirely opposed to my experience, for I believe that this disease is rarely met with; nor do our pathological museums lead one to suppose that it was more common formerly than at the present time. In the Middlesex Museum, Series 8, No. 131, also a recent specimen in the College of Surgeons, are described as examples of this disease. It appears in both these cases as if a fine trans-

parent membrane had been spread over the mucous lining of the bowel, and that this membrane had then been raised into a number of small vesicles containing the colloid material. Some of these excrescences are so minute as to be scarcely cognisable to the naked eye; others, again, are as big as large peas; the whole in fact, strongly impresses one with the idea that a certain number of Lieberkühn's follicles had become obstructed by a thin membrane dilated to a bladder-like excrescence by the mucoid secretion.

Cruveilhier, in his 'Pathological Anatomy of the Body,' gives the following excellent description of a case of colloid cancer. It seems to be little more than an exaggeration of the condition just described:—"A case of colloid cancer of the lower part of the rectum of an old woman. The gelatinous matter is contained in cysts of various sizes, pressed firmly one against the other, so that an appropriate name would be encysted gelatiform cancer. The anus surrounded by a number of different-sized swellings, several of the larger of which were surmounted by smaller swellings, in such a way that the anal opening occupied the bottom of an extremely deep *cul-de-sac*. Two ulcera-

tions could be seen at the entrance of the anus. The rectum, at a little distance from the orifice, presented a zone-like ulceration; it was deep, and had destroyed all the thickness of the rectum in one part of its circumference and communicated with furrows, which penetrated to the diseased skin, which was contiguous to the anus. The disease, which had given the rectum an enormous thickness, stopped suddenly about three inches from the anus. Immediately above the muscular coat was greatly thickened. This disease presented an appearance which I have never seen before. Imagine a multitude of acephalo-cysts of unequal size, of which some resembled pigeons' eggs, tightly pressed one against the other in a fibrous woof, and one would have a sufficiently exact idea of the disease. But these were not acephalocysts. The envelope of each cyst was fibrous, very dense, and very thin, and contained matter resembling apple jelly. On the surface was a cretaceous matter containing calcareous grains. In the centre of the gelatiform matter were seen blood-vessels, resembling those formed in an egg, vessels without linings terminating in a swelling of one of their extremities. The fibrous network, in the middle of which these

cysts were situated, was evidently composed of the membranes of the rectum. I there recognised the longitudinal coat of the intestine. The external covering of the rectum had not the slightest vestiges of cysts, but alveolar tissue of fibrous meshes, filled, like a sponge, with gelatinous matter, which was squeezed out with difficulty. This degeneration extended to the skin. An extremely thin pellicle, almost epidermic, had resisted and covered the swelling on its surface. Behind the rectum was a gelatiform mass freely supplied with blood-vessels."

CHAPTER VI

DIAGNOSIS (*continued*)

WITH ordinary skill in examination, and with careful consideration of symptoms, there are not many diseases liable to be confounded with rectal cancer. Those diseases which, clinically, are at times mistaken for malignant growths are simple or syphilitic stricture and ulceration, polypi, fibrous cellular tumours, and, above all, villous growths.

Villous tumour of the rectum is a rare disease; that is to say, the innocent villous tumour growing slowly with a distinct pedicle. I have only twice come across it during life. Mr Gowland, with probably a larger experience of rectal disease than any living surgeon, states that he has only met with nine cases. Of the two cases which I have seen, one occurred in the practice of Mr Gowland, and it was owing to his courtesy that an opportunity was afforded

of examining the growth both before and after removal.

The patient was a woman, aged 60. She had noticed the tumour for twelve years, but during the last year it had greatly increased in size. Each time she went to stool the growth protruded, and latterly she lost considerable quantities of blood and had become very anæmic. The tumour was not particularly painful, but a constant source of annoyance. There was a great deal of mucous discharge, causing the linen to stick together. The growth, the size of an orange, was of a dark red colour, soft, and covered with a transparent slimy mucus. Upon close examination it was seen to be lobulated in a very distinct manner, looking like a salivary gland. The main branches or lobules were fifteen or sixteen in number; upon these, again, the smaller nodules were crowded together, giving it a mulberry-like appearance. The tumour had an indistinct pedicle, which grew from a considerable surface of mucous membrane. When the tumour was dragged upon the pedicle was well marked. This was caused by the exceeding mobility of the mucous membrane. The base of the tumour moved freely with the mucous membrane, and was not fixed

to the subjacent tissues. In this it showed a marked distinction from ordinary malignant adenoid. Mr Gowland removed this tumour by dilating the sphincter, then forcibly drawing the growth downwards, and strangulating its base in four portions by strong silk ligatures, the portions beyond the ligatures being cut off. The patient made a good recovery.

In the Middlesex Museum is a beautiful specimen of what might appropriately be called disseminated villous growth. In the Catalogue (Series 8, No. 105) it is described as "portion of a colon." The mucous membrane is extensively destroyed by ulceration over the greater part of the specimen, and the remainder forms villous tufts, which thickly stud the surface, some in the form of velvety patches, others as long, branched, floccular processes; the lower part of one portion is free from ulceration, but here the entire mucous membrane is thickened and velvety. The patient was a man, aged 50, who died at the hospital February 20th, 1855. In the preceding September he had a severe attack of cholera; he recovered from this, but died six months later with diarrhœa and bloody discharge.

In the College of Surgeons is a speci-

men of disseminated villous. It was found in the rectum and lower part of the descending colon of a man who had colotomy performed twenty years before death, and who had passed nothing through the rectum during that period. The villous processes are very long and fine, many being more than half an inch in length. They caused no symptoms during life.

Now, in the majority of cases, villous tumour in its clinical history cannot be considered as malignant, for after complete removal it seldom returns, nor does it affect the lymphatic glands or distal organs; but yet there is no distinct line of demarcation between the innocent adenoid growth called villous and the malignant adenoid known as cylindrical cancer. The length of time, often extending over many years, during which a tumour has been growing, its smooth, unulcerated surface, its growing more or less from a pedicle, the looseness of its attachment to the submucous tissue, its comparative freedom from pain, are all favorable signs.

The more the growth departs from the villous form, and the more nearly it approaches to the deep adenoid type of disease, so does its tendency to recur after removal increase. The unfavorable symptoms are a rapidity of

growth, and a large area of attachment, more especially if its base appears to extend into the deeper tissues. That there should be every degree of variety, but yet no clear line of demarcation, between the rapid malignant disease that destroys life in a few months, and the benign villous that has taken many years to grow, might be suspected both from the clinical history and the microscopic appearance of these cases. Mr Allingham, in his admirable work, mentions one of the class of cases that may be considered on the border line.

Simple polypus is not likely to be mistaken for malignant disease. The absence of pain in the growth, the duration of its existence, and, above all, the pedicle, clearly indicate its nature. But there is another form of polypoid disease of the rectum which must be exceedingly difficult to diagnose from malignant adenoid growth. To this form the name of disseminated polypoid growth would seem appropriate. I have only seen in life one case that might possibly be an instance of this disease. In the Middlesex Museum (Series 8, No. 106) is a beautiful preserved specimen of the disease (the manner in which it has been preserved and mounted is a model to curators). In the Catalogue it is

thus described:—"The mucous membrane is thickly studded with growths, some forming simple rounded elevations, others stalked processes, varying in length from a quarter of an inch to an inch, with club-shaped ends. In many places the ends are branched, and in some the ends of neighbouring ones are united together, so as to form an irregular meshwork. They extended from above a cicatrix which was situated three inches from the anus to within a short distance of the ileo-cæcal valve. The patient was a man, aged 46, who died in the hospital from phagedænic ulcer of the foot, and had suffered from ulceration and bleeding of the bowel for three years." To this description I would add that the mucous membrane looks exactly as if it had been cut into narrow strips an inch long, and these strips detached, except at one extremity. This specimen is very remarkable, and it is much to be regretted that a microscopic section of the growth could not be obtained. In Guy's Museum (No. 1863[80]) is another curious specimen of this disseminated polypoid growth. It has, however, quite a different appearance from the one just described, for in that case the outgrowths occupied a larger area than the natural membrane, while their

thickness was often that of a slate pencil. In the growth under consideration the stalks are very much finer, being no larger than a No. 1 catheter, of a uniform diameter throughout, projecting, like worsted threads, half an inch or more into the cavity of the bowel. These stalks are widely separated from one another, there being only about two of them to every square inch of surface, and they are scattered tolerably regularly over the surface. The only account of this rare specimen in the Catalogue is "a portion of the colon with elongated follicles."

Ulceration of the rectum. Save by the history of the patient it is not always possible to diagnose simple from syphilitic stricture of the rectum, but there is usually not much difficulty in determining whether or not stricture depends upon malignant disease. In old-standing strictures there may be considerable thickening of the part, which, at first, might lead to a suspicion of malignancy, but yet, in such cases, although the disease has existed for years, no distinct nodules of new growth can be detected, which certainly would be the case in malignant disease of such long standing. Again, the mobility of the bowel is greater,

while the ulceration, which is rarely absent in any form of stricture, has not the hard, indurated edges common in malignant growths. In simple rectal ulceration there is often so much spasm of the circular fibres as to convey to the finger the sensation of considerable stricture. This, however, to a great extent, gives way by gentle continued pressure of the finger, and nearly entirely disappears if the patient be under the influence of chloroform.

During the last few years cases have been recorded of a peculiar tumour growing between the rectum and the coccyx. This would appear to consist of an enormous enlargement of one of the coccygeal glands, the gland being affected with sero-cystic disease. In the College of Surgeons is a section of the perineum showing such a tumour. It was in a child, aged three years, and had so pushed the rectum forwards as almost completely to occlude its canal by pressure. The tumour is as large as a fœtal head, but the rectum is entirely free from disease.

CHAPTER VII

SURGICAL ANATOMY OF THE RECTUM

THE rectum varies in length from six to eight inches, the latter measurement being more common in advanced life, for as age increases the tortuosity of the rectum is more marked. The rectum extends from the left sacro-iliac symphysis to the anal orifice, its course at first being obliquely downwards for three or four inches slightly to the right of the middle line. It then regains the middle line and follows almost precisely the curve of the sacrum and coccyx as far as the prostate. It then makes another bend slightly backwards to the anal orifice. The rectum is smooth and not sacculated, the separate longitudinal bands found on the rest of the large intestines being absent. Immediately above the anus is a dilatation, often of a considerable size.

The rectum may be conveniently divided into two equal portions. Of these portions, the upper

will be found in relation behind with the sacrum, separated from it by the pyriformis muscle, branches of the internal pudic artery, and sacral plexus. In front, it is in contact with the posterior surface of the bladder (in man) when distended; when the bladder is empty, with the coils of the small intestine. At its commencement the rectum is generally surrounded by the peritoneum, which binds it to the sacrum, but lower down the peritoneum covers its front surface only, and is then reflected on to the bladder, forming the recto-vesical pouch. In the female the vagina and uterus are interposed between it and the bladder. A knowledge of the exact distance to which the peritoneal pouch descends is of much importance. Anatomists vary considerably as to the distance from the anus at which the peritoneum is met with, but the want of uniformity in their results probably depends more on the manner employed in obtaining measurements than in any material deviation in the subjects experimented upon.

Dupuytren* gives the distance as about 70 millimètres, and further states that, if the bladder and rectum be completely empty, this

* 'La Médecine Opératoire de Lagutière et Dupuytren, tom. iv, p. 218.

distance is reduced, the peritoneum falling to the prostate.

Lefranc gives the distance as six inches in the female, four in the male, but does not state whether the bladder was distended or empty in his experiments.

Sappey, Velpeau, and Legendre nearly agree in giving the distance as about five and half centimètres when empty, and eight centimètres when the bladder is distended. The English anatomists Gray and Quain make the distance four inches, but do not mention the state of the bladder or make a difference between the male and female. After careful measurement in a large number of bodies, I believe that two and a half inches when the bladder and rectum are both empty, and an additional inch when distended, will be about the average distance; the raising of the pouch by the extended bladder can be shown by injecting water through the ureter when the abdominal cavity is exposed. One of the means I employed in obtaining the measurements was by injecting the peritoneal cavity with plaster of Paris, and then thrusting a needle through the skin of the perinæum until its point impinged upon the plaster. The peritoneal pouch is pretty firmly fixed in its

position, and in a healthy body can scarcely, if at all, be dragged down by pulling on the lower part of the rectum. In disease, however, especially if accompanied by a stricture, constant strainings of the patient during many months seem to render both the pelvic fascia and the peritoneal pouch much more mobile, and under such circumstances it is more readily drawn down. The lower half of the rectum, extending from the third piece of the sacrum to the margin of the anus, is in relation behind with the sacrum coccyx and fibres of the levator ani. Anteriorly it is in relation with the vesiculæ seminales, the base of the bladder, and the under surface of the prostate, in the male, while in the female it is in connection with the posterior surface of the vagina. At its termination it is surrounded by the sphincter muscles, while it is also partly supported by the levatores ani. In the male the distance of the anterior margin of the anus to the bulb of the urethra is usually a good inch. The blood-vessels of the rectum are derived from the superior middle and inferior hæmorrhoidal, and sometimes a branch or two from the vesical. Of these, the superior hæmorrhoidal is the most important; it is the direct continuation of the inferior mesen-

teric. It runs down behind the rectum, slightly to the left of the middle line between it and the sacrum, from about four to four and a half inches from the anus. It then divides into two branches, which almost immediately break up into three or four smaller branches, and run down parallel to one another close to the anal margin. They then become looped, and anastomose freely with the middle and inferior hæmorrhoidal vessels. The main branches of the superior hæmorrhoidal running parallel with the bowel accounts for the smallness of the hæmorrhage from incisions made in its long axis and the profuseness of the bleeding from cuts made at right angles to its length. The lower part of the rectum being chiefly supplied by these branches, which run down in its coats, explains the comparative freedom from bleeding when isolating the lower end of the bowel from its lateral connections. The veins return the blood partly into the inferior mesenteric, and hence to the vena portæ, and partly to the internal iliac vein. These veins are deficient in valves, and on this account, when the patient is in the lithotomy position, are the chief cause of blood loss during extirpation.

The nerves come partly from the sympathetic

and partly from the sacral flexus. The lymphatics run to the chain of small glands lying on the anterior surface of the sacrum. When in a state of rest the mucous membrane lining the bowel is thrown into a series of folds, the lower of these folds being longitudinal. Mr Houston has demonstrated three or four permanent folds, in direction passing obliquely across the bowel. These can often be recognised during life when the intestines are empty. The minute structure of the mucous membrane will be found explained on page 38.

CHAPTER VIII

TREATMENT

In discussing the treatment of rectal cancer the question at once arises whether the disease admits of a permanent cure. My experience is too limited to allow of a decided answer to this question. French and German surgeons of eminence have boldly asserted that it is sometimes curable, and I have seen nothing to make me doubt that such a result is impossible. When, as has already been shown, the disease is known to exhibit such different degrees of malignancy, it will be quite consistent that, while in some instances the growth is rapidly reproduced after removal, in others its return should be long delayed, or the patient altogether escape a recurrence. The best result within my own experience is the case of a patient, the posterior half of whose rectum I assisted in removing more than three years ago. Clinically and microscopically the specimen

had all the characteristics of cylindrical cancer. The patient has been perfectly well since the operation, without the slightest sign of recurrence. It is not, however, with reference merely to the cure that the treatment has to be considered, but also with a view to retarding the progress of disease and rendering the last years of life as tolerable as possible.

Unfortunately, a large proportion of patients, either from motives of false delicacy or mistaken diagnosis, do not apply for advice until such progress has been made by the disease as to render extirpation impossible. In other cases from the first the affection is too high up the bowel to admit of surgical interference.

The class of cases suitable for extirpation will be found fully described further on, and we will here consider what can be done to mitigate the condition of the patient when local interference is out of the question. Careful attention to diet is of much importance; it ought to be of the most nourishing description, and taken in concentrated form, in order to diminish the amount of fæcal material to be passed. All strong condiments should be strictly avoided, for they frequently produce considerable irritability of an ulcerated surface. Great comfort

will be experienced by the bowels being freely relieved once a day. The presence of a mass of fæces above the disease is a constant source of trouble, producing congestion of the ulcerated parts, and a considerable amount of tenesmus. Purgative medicine should be avoided as much as possible. If required, from a wine-glass to half a tumbler of Friedrichshall water on first getting up in the morning is useful. If the bowels become confined for more than a couple of days a warm-water enema should be resorted to.

Patients in a position to do so should be encouraged to take a fair amount of exercise, unless they notice that such a course clearly aggravates the symptoms. The venous circulation being so much assisted by movement in the surrounding parts probably explains why pain and discomfort is often less after a day of moderate exercise than one in which the patient has lain completely at rest. If, however, the disease implicates or protrudes from the anus, exercise can scarcely be borne from the irritation it produces.

The local treatment is of the utmost importance. The parts should be kept scrupulously clean, great care being taken to prevent the

collection of any of the acrid discharges about the anus. The part should be frequently washed with dilute Condy lotion, while a soft, small pad of charpie, kept in place by a T-bandage, enables the patient to get about without soiling his linen. If there be much pain I have found the injection of an ounce and a half of thin warm starch, to which fifteen or twenty drops of the Liquor Opii Sedativi has been added, give great relief. Such an injection may be employed night and morning. If used more frequently the amount of opium must be diminished. The best way of administering such an injection is by means of a small syringe, the nozzle of which is attached to a piece of fine india-rubber tubing, the other end of the tube being fixed to the half of a No. 6 black catheter, with the eye near the point. This, if gently passed well into the bowel, causes much less pain than the use of the ordinary syringe, and enables the starch and opium to be thrown up to the right place.

In the course of rectal cancer the question of colotomy frequently arises. This operation has been commonly resorted to, either as a means of relief from pain or as a method of treatment in intestinal obstruction.

The experience of surgeons differs very widely as regards the danger to life involved in this operation. During the past eight years at St Bartholomew's Hospital thirteen operations for colotomy have been performed. Of these, nine died and four recovered. During the last eight years at Guy's Hospital, 1869 to 1877, out of twenty-six cases, eighteen died and eight recovered. This gives a proportion of twenty-seven deaths in thirty-nine cases, a mortality of 66 per cent. These are simply the gross results as taken from the published statistics of the two hospitals, but of course do not necessarily mean that the patients died as an immediate result of the operation, but that they died before leaving the hospital and within the year of registration. Mr Allingham publishes in his work twenty-seven operations of colotomy for cancer, with a mortality of only 11 per cent. This great difference in result can only be attributed to the fact before mentioned, that the hospital statistics did not necessarily imply that the patients died from the operation itself. Anyhow, the operation is doubtless of sufficient gravity not to be undertaken without careful consideration.

As regards the relief it affords to pain in

many instances, the operation has been of great value, while in some it has failed to do any good. In the earlier stages of the disease cancer is not generally painful, and in some instances there is little pain through the whole course of the disease, but, unfortunately, such cases are rare, for, as a rule, there is very intense suffering. It is more especially when the surface becomes raw and ulcerated, rendering it liable to inflammation, or when by its size the growth produces pressure on surrounding parts, that pain becomes a prominent feature. The character of the pain produced by ulceration of the surface is not easy to mistake. It is greatly increased by the passage of a motion, and the patient can with difficulty bear the introduction of the finger. If the disease can be reached, a peculiar ragged feel of the ulcerated surface can be recognised by the finger, while if the disease is beyond reach the aggravation of pain shortly before and after a motion, together with the copious discharge of blood-stained slime, will sufficiently indicate the condition of the bowel. It is in these cases that so much comfort can be afforded by the operation of colotomy.

In some cases colotomy fails to give relief

from pain. In these cases it seems that the suffering is not due to an ulcerated surface irritated by fæces, but is rather the result of direct pressure of the deposit upon the surrounding structures. This is especially the case when there is a mass of disease behind the rectum and involving the sacral glands. As an instance of this, the case under my care at the Great Northern Hospital, mentioned on page 94, was a good example.

Often during the progress of this case the patient inquired as to whether something might not be done to relieve the intense pain he suffered. The question of colotomy was twice discussed, but on the following grounds it was determined not to perform the operation. In the first place, notwithstanding that he had some difficulty in passing his motions, there was not at any time an approach to intestinal obstruction. In the second place, the finger in the rectum could pass as far as and into the stricture, and, on examination, no ulceration could be detected, the mucous membrane being intact, nor was there that constant blood-stained, glairy discharge so characteristic of this lesion. Then again, the character of the pain was important,

it being of a constant, dull, burning character, aggravated at night and by pressure on the sacrum, the skin over which was swollen and tender, but not in any way accelerated by the passage of motions. It was, therefore, surmised that the pain was not caused by the passage of fæces over the ulcerated mass, but was rather due to the pressure of the growth. The post-mortem examination fully confirmed this opinion, for there was no ulceration of the mucous membrane of the bowel, but the cancerous mass behind it had caused complete absorption of the coccyx and lower part of the sacrum. It would seem almost certain that colotomy in this case could have afforded little relief, and it is probable that it is in this class of cases that so much disappointment follows the operation.

In complete intestinal obstruction the operation of colotomy is at times invaluable. Complete obstruction often occurs somewhat suddenly; generally speaking considerable trouble is experienced in passing fæces some time before the passage becomes completely occluded, but, as already mentioned, sudden obstruction at times occurs without previous warnings. On the occurrence of obstruction,

if the strictured portion be within reach of the finger, it can be slowly dilated, and the collection of fæces above thoroughly washed out. In the event of the stricture being beyond reach of the finger or of a short bougie, and if relief cannot be obtained by the careful and thorough use of oil-and-water injections, colotomy should be at once performed.

After complete obstruction has taken place and the cause of obstruction is known to be cancerous, I see little use in deferring the operation. Possibly the obstruction might give way to a certain extent if left to time, but this rarely happens, and if it occurs the relief is only very temporary. The longer the operation for complete obstruction is delayed by so much is the chance of recovery diminished. The earlier, therefore, that colotomy be performed for complete cancerous obstruction the better for the patient. Cases sometimes occur in which the obstruction is neither complete nor are the symptoms urgent, but, at the same time, for a considerable period the patient has suffered from much mental anxiety and bodily distress consequent on the exceeding difficulty of obtaining a free evacuation from the bowel.

Under these circumstances, at times, colotomy may be advised. A word of caution may be here given against the habit of administering large doses of purgative medicine when symptoms of obstruction come on. They seldom do much good when the constipation is due to the cancerous obstruction, while, on the other hand, it has occurred to me to see at least one death after colotomy, which was principally due to violent purging setting in after operation, caused by the large doses of medicine previously administered.

Cases will occasionally be met with in which neither colotomy nor excision can be commended, but yet in which much distress may be saved the patient by dilatation of the strictured portion. If a firm annular stricture exists, without ulceration of the membrane, and is within easy reach of the anus, it can be dilated by a three-valve speculum, and kept from subsequent contraction by the daily use of a bougie. The use of the dilating speculum or bougie requires great caution, and many instances are recorded of rupture of the bowel by their use, nor does such an accident seem at all improbable when we know the extent to which the bowel immediately above the stric-

ture has become thinned. Patients should never be allowed to pass bougies for themselves. In one case, in which the disease was near the anus and the bowel greatly narrowed, I taught the daughter (who tenderly nursed her mother) to pass the finger through the stricture night and morning. This effectually prevented further contraction.

In another case, in which the disease returned, it soon grew into a large cauliflower mass, which threatened completely to occlude the bowel. I thoroughly scooped away all the soft growth with a blunt elevator down to its hard base. This was very easily accomplished under chloroform without much bleeding, and the result was highly beneficial to the patient, enabling the motions to pass with ease. The growth was near the anus, and had it been higher colotomy would certainly have been the better treatment.

CHAPTER IX

TREATMENT BY EXCISION

THE name of Lefranc stands prominently forward amongst the earlier advocates for treatment of rectal cancer by extirpation. The operation had been previously mentioned by Morgani, and during the earlier portion of the present century Pinault published some remarks on the subject, but the able paper read by Lefranc before the Academie Royal de Médecine March 24th, 1830, was without doubt the leading cause that established the treatment of rectal cancer by extirpation in modern surgery. Some six or seven years later Velpeau described the operation, with some ingenious modifications, and gave the result of an extensive personal experience. About the same time Recamier's operations were published by Massé. In the year 1854 Chassaignac employed the écraseur. Maisonneuve in 1860, and Fumouze, Nussbaum, and Schuh later, are also well-known modern authors

on the subject. There is a complete and carefully written work on the operation by Marchand, who, taking advantage of previous researches and his own experience, published an interesting work in 1872. In this country we are indebted to Sir James Paget, Mr Jordan, Mr Holt, Mr Allingham, Mr Gay, Mr Holmes, and others, for reviving an operation which had long fallen into discredit amongst English surgeons. The cause of the operation having fallen into disuse, and the severe way in which it has been condemned by surgeons of eminence, is not far to seek, and there is little doubt but that it will again fall into discredit if regarded as the ordinary treatment of rectal cancer. It is of no avail to show that anatomy will allow and that there may be theoretically carried out a surgical operation unless it can be further proved that in the majority of cases such an operation has been followed by beneficial results. There is scarcely an operation upon the human body which is not liable to be abused by the ignorant or enthusiastic, which in the hands of a careful surgeon would be of the utmost value to the sufferer. It requires the most careful selection to choose those cases of malignant rectal disease in which benefit is likely to result from its removal.

Unfortunately the cases are comparatively rare, which admit of extirpation, and I am of opinion that they do not amount to more than twenty per cent. of all the cases of rectal cancer that come under observation.

In dealing with cancer it can be said with little hesitation, that no operation should be undertaken without a reasonable prospect of its being possible to remove the whole disease. To determine whether this be possible or not, the patient should be thoroughly examined by the finger, and this examination is much facilitated if the patient be under chloroform, the bowel being previously thoroughly washed out. Under ordinary circumstances the finger can explore to a distance from four to five inches. If the patient be told to strain down or the abdomen pressed with the hand, a slightly further distance of bowel can be reached. If at this examination the finger fairly pass beyond the disease in an upper direction, the next point to be ascertained will be the implication of the surrounding tissues, and the extent to which the disease has formed adhesions to the neighbouring parts. If the whole circumference of the bowel be involved, it will be found that it is attached more or less firmly to the surrounding

structures, especially on its anterior aspect, which even in a healthy rectum is closely connected to the prostate, vagina, or uterus. It is of great importance to ascertain with some precision the extent to which the structures named are implicated. In the male, although the disease may be situated in that portion of the bowel in contact with the prostate, it is a long while before the prostate itself becomes infected; in women, on the contrary, when the disease is on the anterior part of the bowel, the vagina and uterus quickly become implicated. So long, however, as the vaginal mucous membrane remains free, it is possible to dissect the anterior wall of the rectum from the vagina without making an opening into the latter. If the disease is adherent to the upper portion of the vagina in the immediate vicinity of the uterus, the peritoneal membrane of Douglas's pouch is nearly sure to be drawn towards the disease which cannot be removed without opening the peritoneal membrane. In these circumstances, it is better that no operation should be undertaken; not so much on account of the necessary opening of the peritoneal cavity, as that the disease, once having implicated this membrane, is nearly sure to have spread in the

course of the lymph-paths beyond the reach of complete removal. It is well to remember in the female how near the perineum the peritoneal membrane descends, it being much more commonly at a shorter distance than three inches than at a distance in excess of that measurement. In the male, however, three and a half to four inches from the anus is the common site for the reflection of the peritoneal membrane.

If the disease is confined to the posterior wall, the case is in every respect more favorable to the operation than when situated in front. In this situation there are no anatomical difficulties to prevent the thorough removal of disease to the extent of four to four and a half inches, care being taken to ascertain, if possible, whether the coccygeal or sacral glands are involved. As a rule, glandular infiltration comes on somewhat late; if much enlarged it can be felt like hard nodular masses lying behind the rectal wall.

To sum up briefly the general outline of the cases suitable for operation, I should say that the disease must be within four inches of the anus, and in women must not have extended on the anterior wall further than three inches, and the rectum must be fairly movable on the

neighbouring parts, and there must be no sign of hepatic infection. Each case will, however, have to be decided upon its own merits, after due consideration has been given to the surrounding circumstances. The distances just mentioned, must only be considered as approximate.

Various methods of operating have been proposed. I have employed two methods, the one plan by ligature, the other by the knife and écraseur. The first case in which I removed a portion of rectum was 1875. The portion was quite the lower part of the bowel, certainly not more than two inches; the plan followed was similar to that described by Maisonneuve and called by him Procédé de la ligature extemporanée. Two or three strong curved needles with an eye in the point, a straight bistoury, a dozen pieces of strong silk thread, each a foot long, a piece of strong but not very thick whipcord several feet in length, and an écraseur are the apparatus required. The patient under an anæsthetic is placed in the lithotomy position. An incision just external to the margin is made completely round the anus. The depth of this incision is such as to go well through the skin into the subcutaneous

tissue. One of the needles threaded with silk is then passed from the external cut through the sound tissues beneath the disease, the point being pushed through into the cavity of the bowel above the disease. In doing this the point of the needle is made to describe the segment of a circle in order to be carried well beneath the growth. The loop of silk in the eye of the needle is seized by the finger and thumb or by forceps passed into the rectum. The needle is then withdrawn, the result of this manœuvre being that the loop of silk projects through the rectal wall above the disease, and is drawn out at the anus, the two ends of the thread hanging out of the external groove. The needle should be again threaded, passed in a similar way at a short distance from the first thread, and the proceeding repeated until the whole bowel is surrounded by threads at equal distances. Eight or nine threads will be found sufficient for this purpose. When the arrangement is completed there will be as many loops hanging out of the anus as the number of threads used. These threads Maisonneuve called "les fils provisoirs." The loops of these are attached at a distance of nine inches from one another, to a piece of strong whipcord two yards in

length. Each of the original fils provisoirs is then drawn back, through the bowel and tissues and out of the original hole at which it had first entered. Since, however, the whipcord is attached to each of these loops, a loop of whipcord appears through the original puncture, and as "les fils provisoirs" are withdrawn one after another, the whole bowel above the disease is surrounded by a series of loops, the two ends of any one of these loops being continuous with the corresponding loop projecting externally.

The external loops of whipcord that project from the groove are now cut through, and the opposite ends of each portion being connected with an écraseur, the tissues included in the loop are cut through. After all the portions of whipcord have thus been made to cut their way out, the lower end of the bowel, including the disease, will be completely detached. Upon the only occasion in which I performed this operation I drew down a loop of whipcord each time after passing a "fil provisoir," for it appeared to me that much confusion might result by passing all the threads before any of them were withdrawn. This operation takes considerable time, which is liable to be greatly lengthened should any breakage occur with the

threads. The advantage claimed for the operation is, that it can be performed without hæmorrhage, but since hæmorrhage is not one of the difficulties in rectal extirpation, I consider it has nothing to recommend it, and that it is vastly inferior to the operation as performed by the knife and wire écraseur. The operation which I now perform, but for which I will not, of course, claim the least originality, is the result of many small improvements in the original operation as performed by Lefranc, the most important being the posterior incision of Denonvillier. It is thus performed:—The patient, being prepared for the operation by a purgative and warm-water enema, is placed fully under the influence of an anæsthetic and arranged in the lithotomy position, the legs being drawn up and fixed upon the abdomen by the ingenious double crutch invented by Mr. Clover. This consists of a metal bar eighteen inches in length, at each end of which is a semicircular padded crutch with a strap and buckle attached. The legs being flexed on the thighs the bar is placed between them, so that the crutches fit against the legs just below the knee, and are kept in position by means of the straps and buckles.

The thighs are then bent on the abdomen and a soft leather strap passes over the head and one shoulder and through a ring in the centre of the iron bar of the crutch. The strap is then tightened so as firmly to fix the thighs in a bent position. The instruments required for the operation consist of a strong, curved, sharp-pointed bistoury, a straight bistoury, a pair of blunt-pointed scissors, two pairs of large, strong, vulcellum forceps, a steel-wire écraseur, the benzoline cautery, artery forceps, and ligatures. The left forefinger being passed into the rectum feels for the tip of the coccyx, the curved bistoury, held in the right hand, is passed into the bowel, the point being guarded by the finger-nail, the handle of the knife is then raised, and, with a little jerk, the point is made to protrude through the skin on a level with the tip of the coccyx and exactly in the middle line. The whole of the intervening tissue between this point and the margin of the anus is cut through. If this cut be made with a clean sweep, as near as possible in the middle line, little hæmorrhage will result. The left hand of the operator is now placed on the right side of the buttock, so as to draw the anus outwards and stretch the tissues at the line of junction

of the mucous membrane with the skin. The portion of the rectum or anus through which the lateral incision is to be made must depend upon the distance from the anus of the lower margin of the disease, and, if possible, should be at least half an inch from the growth. The point being selected, the knife is made to cut deeply by using firm pressure, a crescentic incision extending from the margin of the first cut round the anus to a point in the middle of the anterior margin. This cut should be made boldly, and of sufficient depth to extend well into the fat of the ischio-rectal fossa. The forefinger thrust into this incision will readily separate the bowel from the surrounding tissue, except at the insertion of the levator ani, which should be divided with scissors. A small piece of sponge pressed into this cut, and held by an assistant, restrains any bleeding, while the opposite side is treated in a similar manner. The lateral and posterior portion of the bowel being freed from their attachments, the next, and most delicate step in the operation is the separation of the bowel from its anterior connections. In the case of a man this is much facilitated by having a full-sized catheter passed into the bladder and held during the operation,

like the sound in lithotomy. The catheter can be readily felt during the operation, and prevents any chance of the urethra being wounded. The separation of the anterior wall requires the judicious use of the knife and scissors, it being too intimately adherent to be separated by the finger-nail without greatly tearing the parts. During this dissection the bowel should be drawn downwards and backwards by the left hand, while the finger should from time to time be introduced into the bowel-cavity to make sure that the dissection be not carried too close to the bowel. When the dissection has been carried to a sufficient distance beyond the disease, the bowel should be drawn down with a moderate amount of force with vulcellum forceps. The wire loop of the écraseur is then passed over the forceps and detached bowel and pushed up as far as possible before being tightened. The wire is greatly to be preferred to the chain écraseur, it is more easily worked and less liable to get out of order. The wire should consist of eight strands of moderate thickness, only slightly twisted together with great evenness. If too much, or irregularly twisted, the wire will stretch and the strands are liable to break by cutting one against an-

other. After the portion of the bowel has been slowly cut through and removed, any vessels that happen to bleed should be secured by ligature. The hæmorrhage varies a good deal in different cases. It is nearly always, however, free, but seldom, so far as I have seen, to a dangerous extent. It is best treated by making the posterior and two lateral incisions as boldly and rapidly as possible, and not attempting to tie any vessel until the posterior and lateral connections of the bowel have been separated. The bleeding vessels are nearly all situated in the coats of the bowel, so that when the partially detached bowel can be grasped in the left hand, nearly all hæmorrhage is restrained. The vessels in the partially detached portion of the bowel will again, in the latter part of the operation, be cut across higher up, so that to ligature them in the first stage of the operation only wastes time. Should any vessel in the sides of the wound bleed it may be secured. There is, however, little bleeding, except in the bowel itself. This, no doubt, is due to the lower part of the bowel being supplied by the branches of the middle hæmorrhoidal which run down between the coats. There is always considerable oozing after the

diseased portion has been detached, but this is principally venous, and stops when the body is put out of the lithotomy position. The ends of any ligatures used should be cut off short. The hæmorrhage having been attended to, the parts should be carefully examined by the finger, to make sure that no portion of the disease remains behind. For this reason I dislike the use of any form of cautery during the operation, for after its use it is exceedingly difficult to distinguish between the hard nodules of burnt tissue and portions of the disease left behind.

The operation, as just described, is for the removal of the whole circumference of the bowel. Cases, however, will occur in which the disease affects only a small part of the circumference, and in such cases it is not necessary to remove the whole bowel. So far as the operation itself is concerned, it is certainly easier to remove the whole circumference of the bowel than a portion only, but since one of the chief troubles following the operation is contraction of the outlet, and this contraction rarely occurs to an inconvenient extent, unless the whole circumference has been removed, it will be seen that if any considerable portion of the bowel

be quite free from disease it may be left with advantage. In these circumstances the operation requires a slight modification of the method just described. In any case, even if the disease be situated in the middle of the posterior wall, the preliminary incision back to the coccyx is necessary; at any rate, it greatly facilitates the operation. If the disease be confined to the lateral portion of the bowel on either side, the semicircular incision round the anal margin is made only on the diseased side. A strong, blunt-pointed, slightly curved needle, four inches in length, armed with strong string, is then thrust in at the upper angle of the curved lateral incision, at a point opposite the posterior preliminary incision, or further round if the disease has encroached at all on the anterior wall. The needle is made to traverse the tissues external to the muscular coat of the bowel to a sufficient height, and the point, guided by the finger in the rectum, is thrust through the coats into the cavity of the bowel. The loop of string thus passed through is seized by the finger or forceps, the loop being drawn out at the anus, while the needle is withdrawn through the hole at which it entered. By means of this loop one

end of an écraseur wire is drawn back into the bowel and out again at the puncture made by the needle. This, together with the other end of the wire which hangs out of the rectum, are fixed to the écraseur, and the intervening tissues cut through. The strip of bowel between the posterior incision and the one just made by the écraseur can now be separated by the finger from its lateral connections, the separation, of course, commencing from the semilunar incision round the anus. In this way the rectangular flap of bowel in which the disease is situated is detached from the surrounding connections, except at its upper margin. It is then drawn down and cut off by the écraseur. It can be readily understood how the steps of this operation must depend upon the portion of bowel in which the disease is situated. If it be in the middle line behind, the disease, or a portion of it, will probably have been split in two by the first incision, in which case a strip of bowel must be removed on either side; or, again, if it be on the anterior wall, the écraseur wire will have to be twice passed by the thread and needle, once on each side of the disease. It may be mentioned that in the case of women the dissection of the anterior wall is

best accomplished by keeping as close as possible to the vaginal mucous membrane, the dissection being carried through the loose submucous coat. Further details of this operation will be found on a later page.

I employ no dressings of any kind, nor do I put any plug or lint into the wound. Any attempt to draw down the cut end of the bowel and stitch it to the anal margin is perfectly useless; the stitches are sure to give way, and before they do so prevent a free discharge from the wound by allowing spaces in which matter may collect and decompose. It is for the same reason that I employ no dressings. Anything that can the least impede or cause the discharge to collect is a source of danger. The patient, when put to bed, should lie on his back, his head and shoulders well raised, while the knees are bent and supported by pillows underneath. A circular air cushion beneath the buttocks is comfortable for the patient. In this position there is free drainage from the wound. There is little pain after the operation, so that opium is not necessary unless the patient be irritable. The patient should be left quiet till the morning following the operation, when the wound should be gently, but very thoroughly, syringed

out by means of Higginson's syringe with a warm carbolic lotion. Great care should be taken that the syringe be introduced well into the wound, so that every part be thoroughly washed, and all blood clot removed and deodorised. This proceeding may be repeated two or three times a day. All fluids and secretions are prone very quickly to decompose in this neighbourhood, and the proximity of the peritoneum, and the free supply of absorbents in this part of the body render the absorption of putrid material peculiarly dangerous. My experience is at present too limited to state the fact with certainty, but I think that it will eventually be found that the liability to peritonitis is in direct proportion to the extent to which the products of putrefaction are allowed to accumulate. Unfortunately it is scarcely possible in operations about the rectum strictly to carry out Professor Lister's antiseptic treatment, but every care should be taken to exclude, as far as possible, the chance of septic infection from without. The patient usually convalesces rapidly, and can leave his bed in two or three weeks.

CHAPTER X

CONDITION OF THE RECTUM AFTER OPERATION

THE cut end of the bowel quickly forms attachments to the sides of the cavity that remain as the result of the operation, and seems during the process of cicatrization to be drawn considerably downwards, so that if three inches of the bowel have been removed, and the parts are examined six months later, it will not be found that the gut terminates three inches above the external orifice, but at a distance of one to two inches from it, and that the lining of the canal for the remainder of the distance is composed of a tissue similar to the ordinary scar tissue found on cutaneous surfaces, but of a softer consistency. This tissue has sometimes a great tendency to contract, thus narrowing considerably the outlet. If, however, the whole circumference of the bowel has not been removed, and a strip of the normal mucous membrane, however narrow, has been

left, extending to the anal margin, the tendency to contract is greatly diminished; and for this reason, when the disease affects only a portion of the bowel, it may be well not to remove the whole circumference.

It might be supposed that the destruction of the internal sphincter, and at the same time more or less damage to the external muscle, would be followed by an incontinence of fæces. In my Jacksonian Essay, out of thirty-six cases recorded defæcation was normal in twenty-three instances, while fæces could be retained, when not too fluid, in six cases, incontinence resulting in seven instances only. My own experience is quite in accordance with these facts, and in one case only was incontinence a trouble, and this was complicated with stricture. In all cases, after operation there is at first complete incontinence, and the patient loses all consciousness of the passage of fæces, but as convalescence advances control returns. In those instances where portions of the sphincter have been left intact, the muscle, temporarily paralysed, probably regains its power, but when the sphincter has been wholly removed retention of fæces requires another explanation. Chassaignac attributed it to an hypertrophy of the circular

fibres around the termination of the cut margin, constituting a sort of rudimentary sphincter. Lefranc considered that it depended most probably on the somewhat narrow, tortuous course through the cicatrix, assisted by the surrounding muscles. In the Bulletin of the 'Société de la Chirurgerie' of 1861 an interesting discussion on this subject will be found. In the majority of cases it does not appear that hypertrophy of the circular fibres has anything to do with the power of retention, nor in cases that I have examined has any such hypertrophy been found. The common plan by which the passage of fæces appears to be prevented will be best gathered from a description of Mrs MacM—'s case, whose rectum I have frequently examined since the removal of two inches and three quarters of bowel twenty months ago. Mrs MacM— is able to retain both wind and motions, as a rule, completely, but if she has any diarrhœa the linen is slightly stained. Upon separating the sides of the buttocks the anal aperture appears as an oval opening in the skin, one inch long by three quarters wide. The margin of the opening is formed by a slight inversion of the skin. The edge is not hard and admits of a certain amount of stretching; just within the

orifice of the skin is seen a bright red protrusion, which upon examination is found to be a sort of prolapse of one side of the bowel, completely blocking up the opening. Very slight pressure enables the finger to pass into the bowel. This valve-like approximation of the sides of the bowel would appear to be but a feeble guard against the passage of fæces, but nevertheless in practice it is completely efficacious.

It is probable in discussing this question of incontinence that sufficient consideration is not given to the normal method by which fæces pass from the bowel. It must not be supposed that there is always a mass of material just within the sphincter ready to pass away directly its grasp is relaxed. In health, unless the bowels be very loose, a certain amount of straining by means of the abdominal muscles is necessary to bring the fæces against the sphincter, which eventually yields to the pressure, so that during the greater portion of the day the last few inches of the rectum is empty.

CHAPTER XI

PROGNOSIS

THE results to be expected from the operation of excision of the rectum may be considered under the following heads :

A. The immediate risk to life from the operation.

B. The probable amount of life to be gained.

C. The conditions under which such life is acceptable.

The great difficulty of estimating with exactness the relative mortality following operations of an exceptional nature is notorious. The surgeon has every inducement to publish those cases in which success has been obtained. There is a natural increase of interest in beneficial results, and a natural inclination to give greater prominence to operations followed by complete or partial recovery. When cases are principally drawn from authors who publish the whole of their experience, this objection is in a

great measure obviated, and data sufficiently reliable for comparison may be obtained. In the tables appended to the Jacksonian Essay no doubt a few of the cases are mere isolated records of success, but it will be found that the majority represent the whole experience of reliable authors. On these grounds it is probable that the mortality record is fairly reliable.

Out of a total of 53 cases { 44 recovered, 9 died,

giving a mortality of about 17 per cent.

In my own experience of 13 cases . . . { 11 recovered, 2 died,

which closely tallies with the numbers just given.

The causes of death in the nine cases mentioned in the Jacksonian Essay were as follows:

Peritonitis . .	5	6
Cellulitis . . .	1	
Erysipelas . . .	1	
Pyæmia	1	
Not stated . . .	1	
		9

The cause of death in the second series of cases :

Died of peritonitis . .	1
Died from the shock . .	1
	2

The frequency of peritonitis at once attracts attention. In three of these cases the peritoneum was known to have been opened, while in each of the other cases more than three inches of bowel had been removed. The danger of this accident must necessarily be in proportion to the height of bowel removed and not only might the risk be reduced by a more careful selection of cases, but also by a more careful attention to the subsequent treatment.

In calculating the gain to life through this operation not only must be considered those fortunate few who escape recurrence, but also the longer or shorter time free from disease which the majority of the sufferers enjoy before a second manifestation of the disorder.

In the Jacksonian Essay forty-four cases of recovery from the operation are recorded. The subsequent history is not stated in sixteen of these cases : the results are given for the remaining twenty-eight; three of these were deducted, from

the nature of the disease being doubtful. Of the remaining twenty-five cases no recurrence had taken place in eleven instances, after intervals varying from a few months to some years. In three of the cases over four years had elapsed without recurrence. In the remaining fourteen cases recurrence took place after intervals varying from four months to three years. In some of these the recurrence was of a very trivial nature, and was easily removed by a second operation, while in others the patients died of general cancerous cachexia.

My own experience gives very similar results. In eleven cases that survived this operation the disease returned in four. In two others the disease returned as a small localised nodule (indeed, I doubt whether it had ever been removed at this spot); in both these cases a slight second operation completely relieved the patients, who have remained well since. In the remaining cases the disease has not returned, one operation being three years ago.

There can be no doubt whatever that if the patient survives the operation, his life will be considerably prolonged, for it is the pain and distress of the local disease that so hastens the death of the patient; and, further, however few

the cases may be, it is always possible to give a prognosis that years may elapse before the return of the disease, or possibly that the case may result in a permanent cure.

The condition of the patient after operation.— The most distressing symptom of rectal cancer is pain at the seat of disease. This pain is in no proportion to the extent of the growth, and, indeed, is often more intolerable from a small cancerous ulceration involving the sphincter than from extensive disease in the higher part of the rectum. Complete relief from this pain is the first and most marked result of the operation. Indeed, the patient will often state on the morning following the operation that a better night has been passed than for months previously.

With the removal of disease not only is there cessation of pain, but also the tenesmus and blood-stained discharge ceases, and the patient rapidly improves in general health and strength. If the disease return in distal organs the suffering is usually inconsiderable, while in the event of a local return there appears to be very little pain compared with that caused by the original growth, a fact probably accounted for by the destruction of the terminal nerve-filaments at

the seat of operation. The possibility of incontinence cannot be urged as a drawback to the operation, for if the cancer be allowed to remain unoperated upon it is nearly sure to become one of the complications. Contraction of the outlet of the bowel sometimes occurs. In one of my cases this caused much trouble. This contraction can to some extent be prevented by keeping a hollow ivory plug in the wound during the process of cicatrisation. Moreover, it only takes place in a certain proportion of cases, but when it occurs it is undoubtedly a source of some trouble, but here, again, we have to compare it, not with a healthy rectum, but with the state of the diseased parts before the operation was undertaken.

CHAPTER XII

CASES

My experience of the operation for excision of the rectum extends to fourteen cases. In half of these I performed the operation, while in the remainder I had been kindly asked by professional friends to assist. Many of these operations were on private patients, therefore I do not feel at liberty to publish them.

In the following pages will be found the details of some of my operations, together with an interesting case under the care of Sir James Paget, which I am enabled to include through his kind permission.*

* Since writing the above I have unfortunately to record a death from chloroform, but this took place before the first incision had been completed, and was quite irrespective of the operation. I mention the fact as another instance of the advisability of employing ether—a perfectly safe anæsthetic, especially suitable for rectal, or, indeed, any operation save those about the face.

Case 1.—In this case the patient was aged forty-six. He had suffered from rectal troubles for a year and a half. For many years previously, however, he had been much troubled with piles. Upon examination an epithelial-looking growth was found involving a considerable portion of the anal margin, and extending upwards on one side about an inch and a half. The part was very painful, and seemed to have caused some prolapse of the bowel. In this case I removed the whole margin of the bowel by means of the method advocated by Maisonneuve. A description of the proceeding I adopted will be found on p. 148, so that it need not be again described. The operation was tedious and troublesome, and after the ligatures had cut through I was not quite satisfied that sufficient margin had been given to the disease, so that the operation was further prolonged by the use of scissors and actual cautery. The patient made a good recovery, and was well eight months after the operation, since which time I have neither seen nor heard anything of the case.

Case 2.—A. M—, æt. 61, being kindly sent to me by my friend Mr. Doran, was admitted

under my care at the Great Northern Hospital in April, 1878. She was very thin and emaciated, and for some time had been unable to follow her occupation as a laundress. For more than a year she had suffered discomfort in the rectum, and had lost blood from time to time, a muco-purulent discharge being persistent. During the last few months the pain had greatly increased, her nights were sleepless, she was tormented with a constant desire to go to stool. She suffered from alternate attacks of diarrhœa and constipation, and could not retain her fæces when liquid. On examination with the finger, commencing just within the anus and extending upwards a couple of inches, an ulcerated mass of cancer was felt. This did not completely surround the bowel, a small portion of the anterior wall being free. The patient being placed under chloroform, and in the lithotomy position, a curved bistoury, guided by the finger, was introduced into the rectum, the point then thrust through the posterior rectal wall, and made to emerge at the tip of the coccyx; the tissues intervening between this point and the margin of the anus were cut through with a clean sweep. The sides of the wound were held

apart by the folds of the nates being forcibly drawn outwards, and a semilunar incision was made at right angles to the first cut; this, the second incision, was just within the margin of the anus, and extended completely round the bowel, while in depth the point of the knife was carried well into the fat of the ischio-rectal fossa. The lateral and posterior attachments of the bowel were separated by the fore-finger with the sparing use of the cautery and the knife. The dissection of the anterior wall was made more carefully, and entirely with the knife. The free portion of the bowel was now seized and drawn down with a moderate amount of force, and cut through just above the disease by means of the benzoline cautery. No attempt was made to draw down the bowel, neither were any sutures or dressings used. The patient made a quick recovery, leaving the hospital in three weeks, free from all pain, with some control over her motions, and her general health greatly improved. Three months after this operation she had complete control over the motions, except when she had diarrhœa, at which times her linen would be a little stained. She complained of no pain, but of a slight itching sensation. Upon examining the parts

there was found a small rose-coloured elevation, of the size of a split pea, upon the anterior margin of the mucous membrane. This was snipped off pretty freely with scissors. Since then the patient has been frequently seen; she suffers no pain whatever, has not the slightest symptom of any return of the disease, and states that she enjoys better health now (June 16th, 1879) than for many years past. When she has diarrhœa, however, she has to wear a diaper; this causes her no inconvenience. It is now one year and two months since the operation.

Case 3.—The patient, æt. 59, had suffered from hæmorrhage and pain from the rectum for over a year. Latterly he had been getting considerably thinner, and the pain was much increased. He was tormented with a constant desire to go to stool, and was unable to follow his occupation. The skin round the margin of the anus was red and slightly œdematous, but otherwise seemed healthy. There was a considerable discharge of muco-purulent matter, with a highly offensive odour. This discharge was generally streaked with blood. Upon examination of the rectum with the finger, a pro-

ceeding which was exceedingly painful, a mass of disease was found in the posterior wall of the rectum. The disease felt like a raised excavated ulcer, the base being firm, thick, and hard, while the margins were considerably raised above the level of the surrounding membrane, the edge slightly overhanging the healthy membrane. The diseased portiou was oval in form, its long diameter an inch and three quarters, its small diameter an inch and a half. Its lower border was about an inch and a half from the anus, and its upper border was at a distance of three inches. The disease occupied the posterior half of the rectum, the anterior portion being healthy and movable. The base of the diseased portion was rather firmly attached to the tissues behind it. It was decided to remove this growth by operation, which was done by Sir James Paget in 1876, who kindly asked me to assist him. The patient being thoroughly under the influence of chloroform, an incision was made in the median line behind from the margin of the anus to the base of the growth. This incision cut through all the tissues nearly as far as the tip of the coccyx. The sides of the wound being now held apart and the folds of the nates being forcibly drawn

outwards, a groove was burnt with the thermo-cautery at right angles to the preliminary incision on either side. These grooves commenced at half an inch within the margin of the anus, and extended laterally about an inch. It will be seen that the effect of this was a crescentric cut dividing transversely an inch of the bowel upon either side of the posterior middle line. The two incisions together divided the rectum in rather more than half of its posterior circumference just within the anal margin. A strong curved needle, four inches in length, with the eye near the point which had been previously blunted, being threaded with strong twine, was pushed in at the upper angle of one of the lateral cuts, and was thrust forward external to the rectal coats parallel with the bowel, till the point with the thread was made to perforate the bowel and protrude into its cavity at a distance of about three inches from the anus, that is to say on a level with the upper margin of the disease. By means of the thread thus introduced, one end of a wire écraseur was drawn first within the bowel, then, through the passage made by the needle, out again at the point where the needle entered. The two ends of the wire were then attached to

the écraseur, and the whole intervening tissue slowly cut through. A similar proceeding was then adopted on the opposite side. The strip of bowel, between the two lateral cuts made by the écraseur, which included the posterior half of the rectum, was then separated by the forcible use of the forefingers and scissors from its attachment to the subjacent structures. It will be seen that by this manipulation a rectangular flap of bowel in which the disease was situated was separated at all points except at its upper margin. This flap, together with the growth, was seized by a strong pair of vulcellum forceps, and drawn downwards. A loop of the écraseur wire was passed over the forceps and over the growth, and by this means the rectangular flap was cut off a quarter of an inch above the disease. The whole proceeding, owing to the frequent use of the écraseur, occupied a very long time; the hæmorrhage, however, was comparatively trifling. A piece of lint, soaked in a solution of perchloride of iron was placed in the wound and the patient removed to bed.

A restless night was spent; in the morning the pulse was 110 and the temperature 102°. The wound was gently syringed, and the plug

of lint came away affording considerable relief. On the third day after the operation the pulse was only 80, and the temperature had fallen to 99·5°. The discharge was now profuse. There was little or no pain, and he described himself as more comfortable than he had been for many months previously. The patient convalesced in the most satisfactory manner without any trouble save that he could not hold his motions. At the end of three weeks he was about his room. Three months later he was entirely free from all pain, and gained much in weight and strength, and was able to resume his daily occupation without inconvenience, the power over the motions having greatly improved. At the present date, nearly three years after the operation, he is in perfect health, suffers no pain, has complete control over the fæces save when he has a tendency to diarrhœa, when the linen is a little stained. There is no symptom whatever of recurrence.

Case 4.—R. S—, æt. 65, admitted into the Royal Free Hospital, 1878. Mother lived to age of eighty-five. Father said to have died of consumption. Two brothers died at the age of twenty from consumption, also a sister, rather

older, of the same disease. No history of cancer in the family; has seven children living in good health, and has lost none. The patient was brought up in the country, but has lived in London for the last forty years, and has worked as a plumber all that time. He has never suffered from lead poisoning or any other form of illness, always having good health up to the spring of 1878. He then noticed that he passed blood and slime with his motions, and was troubled with a frequent desire to go to the closet. Gradually defæcation became painful and difficult, and he rapidly lost strength and appetite, suffering much from nausea. His complexion became pallid and yellow. He kept to his work till admitted into the hospital late in the year. When admitted the suffering was very great, especially at night.

Upon examination the anus appeared healthy, with the exception of a small œdematous fold of skin. Upon introducing the finger within the bowel the disease could be plainly felt occupying the whole circumference of the rectum, its lower margin being an inch and a quarter from the anus, while its upper limit was at a distance of three and a half inches. The growth felt like an ulcer having a firm,

hard base, with overhanging, raised edges. From the left upper part of the ulcer a considerable mass of soft, fungating growth projected into the rectum. By a little pushing the finger passed beyond the disease, and the bowel felt soft and healthy. The patient being thoroughly under ether and in the lithotomy position, assisted by my colleague, Mr William Rose, I removed the lower three inches and a half of bowel as follows:—A strong, sharp-pointed, curved bistoury, shielded by the finger, was passed into the rectum and made to protrude through the skin at the tip of the coccyx, the intervening tissues were then cut cleanly through in the middle line. The sides of this incision being held apart by forcibly drawing on the nates, a second cut was made at right angles to the first, round the bowel, at a distance of half an inch from the anus. In making this incision, by bearing hard upon the knife the cut extended deeply into the ischio-rectal fossa. In the upper part, that is, opposite the urethra, the cut was made more cautiously and less deeply. The lateral and posterior attachments of the bowel were then quickly separated with the forefinger, assisted here and there with the touch of the knife.

The detached part of the bowel was now grasped with the left hand, a proceeding which, to a great extent, controlled the hæmorrhage, and was drawn downwards and backwards, and the attachments of the anterior part of the bowel to the urethra and prostate cautiously dissected through.

This dissection was greatly facilitated by a full-sized catheter having been previously passed along the urethra and held hooked up against the pubic arch by an assistant. This catheter could be easily felt during the dissection, and prevented the possibility of a wound in the urethra. When the bowel had been detached from the surrounding parts to a level a little above the disease, it was drawn down by vulcellum forceps, and the loop of a strong wire ecraseur passed round it; it was then slowly cut off. The lower end of the remaining portion of the bowel was free in the wound, owing to the dissection having been carried rather higher than necessary. A small portion of the posterior margin, feeling slightly thickened, was cut off with scissors. The specimen, after removal, showed well-formed adenoid tissue in its older portion (see Pl. X, fig. 1), while the fungating mass showed

more embryonic adenoid tissue (Pl. X, fig. 2). The patient convalesced without accident, with the exception of an attack of gout, which made him uncomfortable for a few days. He left the hospital at the end of a month. Great attention, as usual, was paid to cleanliness of the wound, which was thoroughly syringed out with weak carbolic lotion several times a day. On his leaving the hospital there was some contraction of the outlet of the bowel, but the forefinger could be passed without difficulty. He was supplied with a short bougie, and directed to use it daily, and to present himself for examination at the end of a week. This, however, he neglected to do, and was not seen for two months. He then presented himself, complaining of some difficulty in passing his motions, but otherwise in no pain. Upon examination the outlet of the bowel was much narrowed, and would not at first admit the forefinger, but with a little manipulation the obstruction gave way and admitted the finger readily enough. The patient was directed to use the bougie daily. This he continued to do for three months, the contraction not increasing and he could pass his motions in comfort. At this time all the parts were comfortable,

with no sign of a return of the disease. I have seen the patient once since. He had given up the use of the bougie, the contraction, in consequence, apparently having increased. There was no return of the disease (eight months after operation).

Case 5.—A. G., æt. 54, a small emaciated woman, with a dark complexion, was admitted into the Royal Free Hospital, November 7th, She had six children living, in good health, and has lost none. The father and mother died at advanced ages; there was no family history of tumours or phthisis. The patient had good health until two years ago, but has always been subject to constipation, for which she has taken castor oil in considerable quantities. Two years ago, she began to suffer from pain and a feeling of weight in the rectum. Eighteen months ago, she first noticed a discharge of blood and mucus from the bowel. During the past year she had lost flesh rapidly, having formerly been very stout. She had been for some months in a London hospital, but obtained no relief. Her sufferings were very great; she had lost control over the sphincter, the fæces escaping without her

knowledge. Upon examination, the parts were found to be very tender, with a growth extending almost to the margin of the anus, about which the skin was œdematous and excoriated. A considerable mass of disease occupied the lower three inches of the bowel, taking the form of a large irregular ulceration with a hard base and fungating margins. At one point, the disease extended somewhat higher than three inches. The recto-vaginal septum was implicated, but the mucous membrane on the vaginal aspect appeared sound.

Considering the length of time that the disease had existed, and the extent to which it had encroached on the anterior wall of the rectum, it did not seem a very favourable case for operation. The patient, however, was exceedingly anxious to have an attempt made to remove it, having been recommended to consult me for that purpose by my friend and colleague, Mr. Macready. The operation was performed in an almost precisely similar manner to that in the previous case. There was no difficulty in detaching the bowel from its posterior and lateral connections, but it required some time and caution to dissect through the recto-vaginal septum; this was done by

keeping as near as possible to the mucous lining of the vagina; but even at the time there appeared a suspicion that the disease at this part had not been thoroughly removed. Whilst detaching the upper anterior part of the rectum, the peritoneal membrane was distinctly seen. The diseased bowel being drawn down was cut with a wire écraseur a little more than three inches from the anus. Upon detaching the portion, a small coil of intestine was seen in the upper part of the wound, but it was not known at what period of the operation the peritoneal membrane had been opened. The knuckle of bowel was gently pressed up by the finger and disappeared. The wound was treated in the ordinary way, without any dressing or sutures, and kept thoroughly free from all discharge by frequent syringing with warm carbolic lotion.

The patient never had a symptom of peritonitis, recovered quickly, and left the hospital at the end of the month free from all pain and much stronger and more comfortable than she had been for a long time; she had no pain on passing her motions, over which she had a fair amount of control. She appeared well and comfortable for three months; she

then complained of some irritation about the part, and upon examination a soft fungating nodule could be felt springing from the anterior wall of the rectum. She suffered little pain. A month later, the disease had greatly increased, forming a considerable fungoid mass, blocking up the lower end of the rectum, causing some difficulty in passing her motions. It did not seem advisable to make any further attempt by a cutting operation; but, acting as other surgeons have done in these circumstances, as far as I could with the finger-nail and a blunt gouge, I scraped away the cauliflower growth down to its hard base. There was not much bleeding during this proceeding, and it gave her great relief, and she was enabled to pass her motions with comparative ease. I fear, however, that a quick return is inevitable.

Case 6.—Mr —, a tall, fine man, born in Lincolnshire and living many years in London, and with no family history of cancer, sought advice under the following circumstances. Fifteen years ago he suffered considerable pain in the lower part of the rectum; this was followed, two months later, by an abscess in the ischio-rectal fossa. The abscess was allowed to

break by itself, and for two years he had much trouble owing to its leaving a fistulous tract. This eventually healed, and he was quite well for fourteen years. For the last eight months he had suffered considerable pain in the lower part of the bowel. This increased to such an extent as to cause him sleepless nights, and he was unable to sit down without pain. He also suffered much distress by fancying his bowels had never been completely relieved. Upon examination, about an inch within the rectum, and midway between the posterior and lateral wall of the right side, that is, in the site of the old fistula track, was a hard nodule the size of a pigeon's egg. The mucous membrane was quite sound and healthy, but did not move very freely over the lump. He had had no discharge of blood or pus from the bowel, but after walking would notice a certain amount of sticky mucus on his linen. The anal margin was not excoriated and looked quite healthy.

This lump was removed by means of the écraseur and cautery. The patient made a tedious convalescence, but could walk about at the end of two months, and three months after the operation regained to a considerable extent his previous health. Upon section the tumour

was seen to be composed of a quantity of cysts two or three of which were as large as peas, but the greater portion much smaller, not larger than a pin's head. The cysts were held together in the meshes of a firm fibrous tissue, and they contained a thick, transparent, mucoid fluid. From its naked-eye appearances it was judged not to be malignant, and thought unlikely to return. However, it turned out otherwise. Four months after the operation the patient began once more to experience uneasiness about the part. This did not amount to pain at first, but after a while he experienced considerable pain, and he was again troubled with tenesmus. In December, 1878, rather more than a year after the operation, the disease had returned. Upon examining the patient, a firm, hard nodule, nearly as large as the original one removed, could be felt in the site of the old scar, while a suspicious hardness extended under the mucous membrane for a short distance from this spot. The patient was anxious for a second operation, and seeing the disease was still limited, I undertook its removal. This was done entirely with a knife by cutting out the old cicatrix together with the growth and a portion of the surrounding

mucous membrane. The part removed was well within the sphincter, and extended upwards a couple of inches. There was no bleeding of any importance. By using the knife entirely and discarding the écraseur, the operation took a quarter the time it would have occupied had the latter instrument been used. No sutures or dressings of any kind were employed. The patient passed a fairly good night, the temperature marking in the morning 100°, and the pulse 90. The wound was carefully but thoroughly syringed out with warm Condy lotion, a Higginson syringe being used. By this means every portion of blood-clot which had collected about the wound was removed. This syringing operation was repeated three times a day, besides which the external parts were frequently wiped with a soft sponge to keep it free from the discharge which was very plentiful. The patient kept very still, lying chiefly on his back with the knees supported by a pillow. He quickly convalesced without a bad symptom, the temperature never exceeding 100°.

Three weeks after the operation he returned home and was soon able to get about. He had no control over the fæces for the first

three weeks, but at the end of six weeks the power completely returned. The growth when removed closely resembled that taken away on the first occasion, the proportion of fibrous tissue was increased while the number and size of the cysts was smaller.

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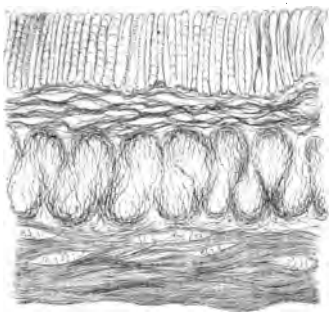
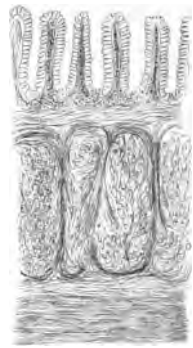
PLATE 1.

Fig. 1.



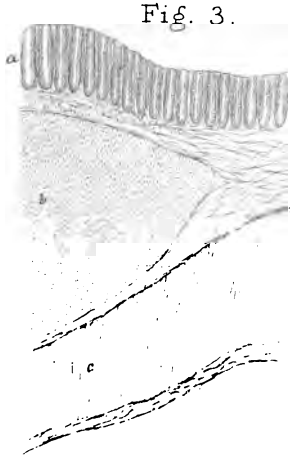
Healthy Section of rectal wall (Rabbit)

Fig. 2.



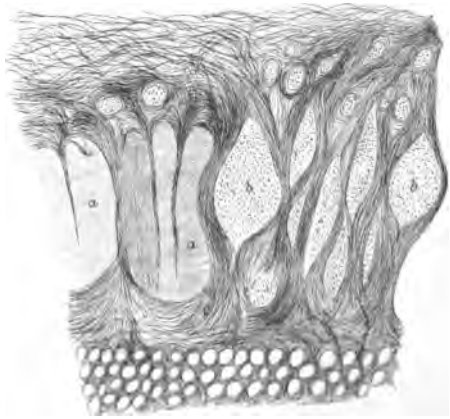
Healthy Section of rectal wall (Human.)

Fig. 3.



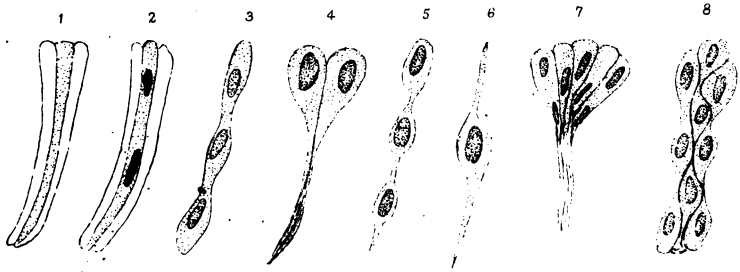
Growth (b) extending between muscular (c) & mucous (a) coats

Fig. 4.

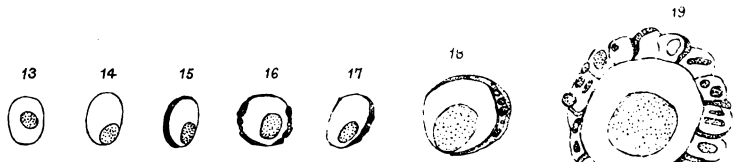


Section of muscular coat, new growth (b b) taking place of muscular fibres (a. a.) Hypertrophied inter muscular bands (c.c)

W.H. Cope, imp. Montague Barlow

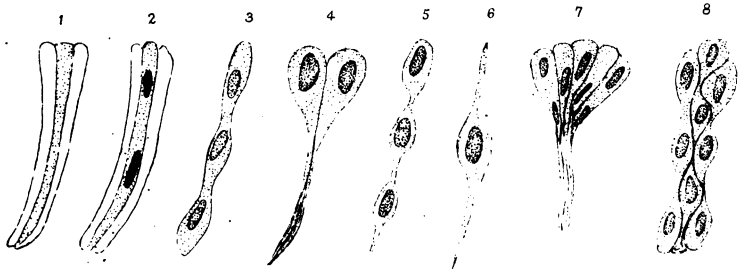


Cells from the surface of tumor

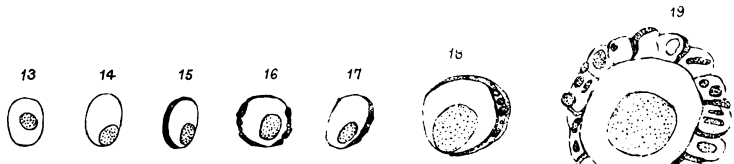


Cells from deeper portions of growth.

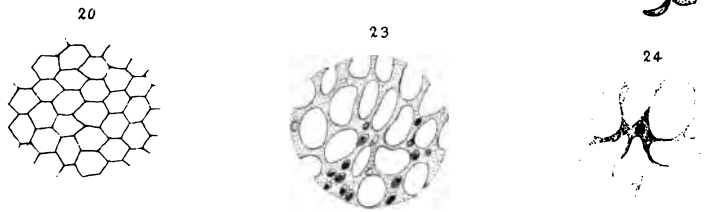
Sections of Lib...



Cells from the surface of tumor



Cells from deeper portions of growth.



Sections of [illegible]

PLATE III.

Fig. 1.

Pigmented nuclei continuous with lymphoid cells.

Fig. 2.

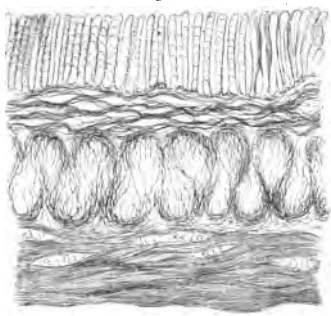
Villous projection shewing secondary offshoots commencing at a. a.

Fig. 3.

Section of mucous & submucous tissue shewing hypertrophied follicles

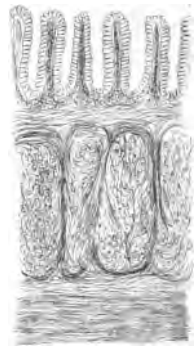
PLATE 1.

Fig. 1.



Healthy Section of rectal wall (Rabbit)

Fig. 2.

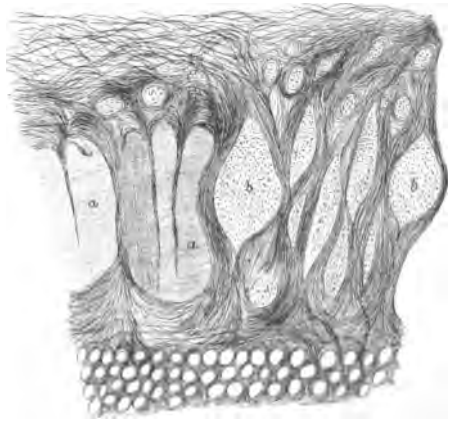


Healthy Section of rectal wall (Human.)

Fig. 3.

Growth (b) extending between muscular (c) & mucous (a) coats

Fig. 4.



Section of muscular coat, new growth (b b) taking place of muscular fibres (a. a.) Hypertrophied inter muscular bands (c.c)

PLATE IV.

Fig. 1.

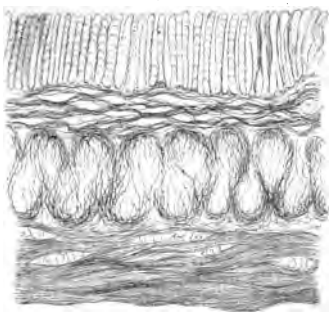
Cavities near surface becoming gradually filled with gland tissue.

Fig. 2.

Shewing bipennaform arrangement of epithelium upon central stalks of retiform tissue.

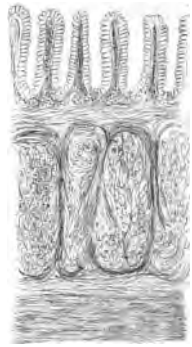
PLATE 1.

Fig. 1.



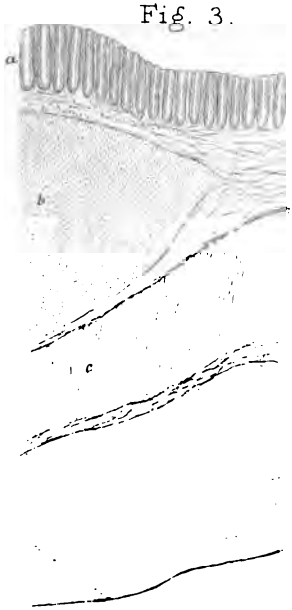
Healthy Section of rectal wall (Rabbit)

Fig. 2.



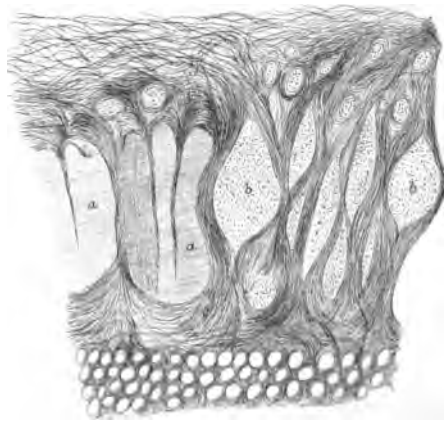
Healthy Section of rectal wall (Human.)

Fig. 3.

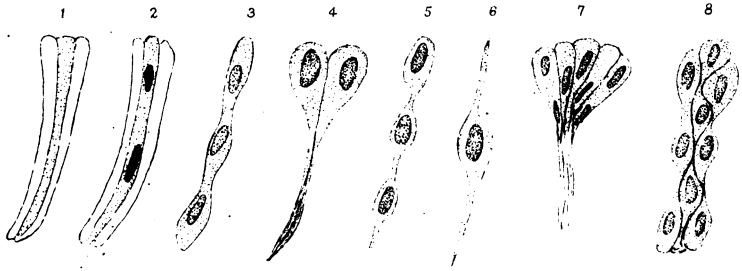


Growth (b) extending between muscular (c) & mucous (a) coats

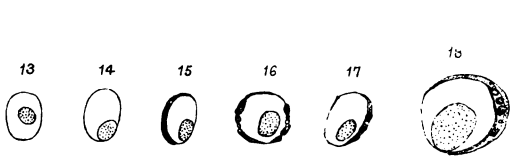
Fig. 4.



Section of muscular coat, new growth (b b) taking place of muscular fibres (a.a.) Hypertrophied inter muscular bands (c.c)



Cells from the surface of tumor

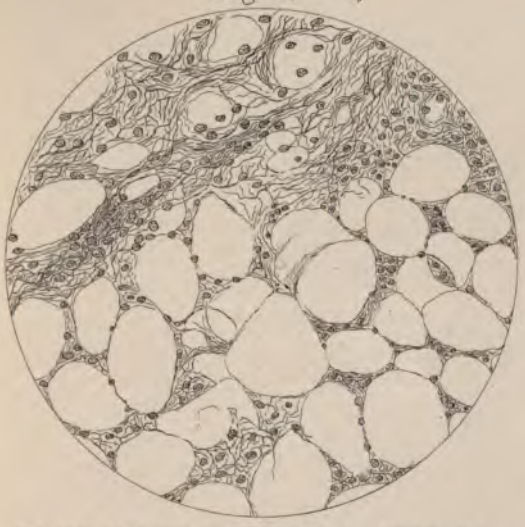


Cells from deeper portions of growth.

Sections of [illegible]

PLATE VIII.

Fig. 1.



Fat cells near margin of the tumor. Between the Fat cells there is an infiltration of small lymphoid looking cells.

Fig. 2.

Different portion from same specimen, the lymphoid cells having a distinctly epithelial character. In places the cavities of the original fat cells remain, in others they have become obliterated.

Hartnack

PLATE III.

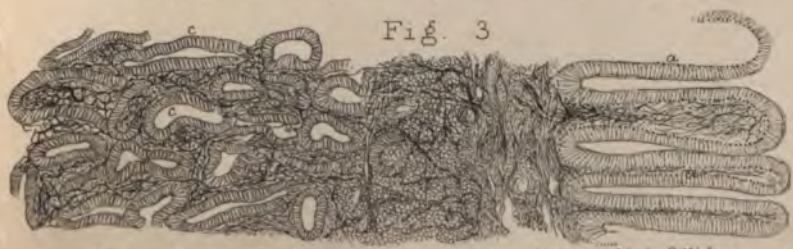
Fig. 1.

Pigmented nuclei continuous with lymphoid cells

Fig. 2.

Villous projection shewing secondary offshoots commencing at a. a. a.

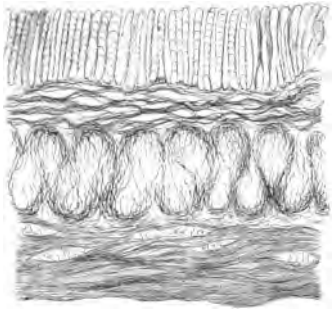
Fig. 3



Section of mucous & submucous tissue shewing hypertrophied follicles

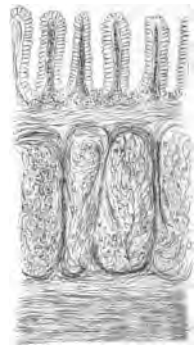
PLATE 1.

Fig. 1.



Healthy Section of rectal wall (Rabbit)

Fig. 2.

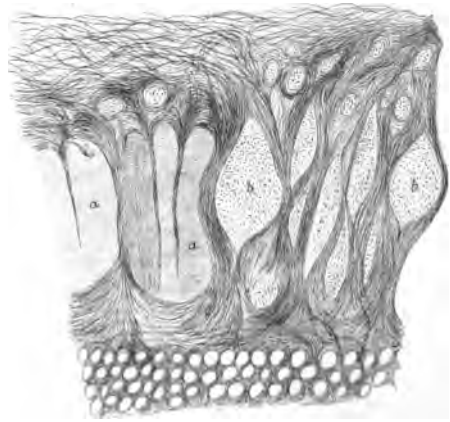


Healthy Section of rectal wall (Human.)

Fig. 3.

Growth (b) extending between muscular (c) & mucous (a) coats.

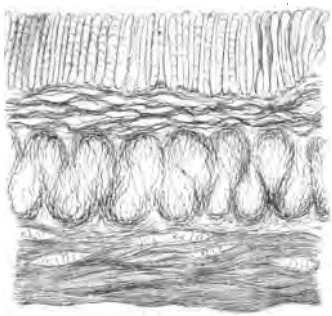
Fig. 4.



Section of muscular coat, new growth (b b) taking place of muscular fibres (a..a.)
Hypertrophied inter muscular bands (c.c)

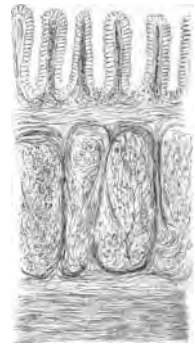
PLATE 1.

Fig. 1.



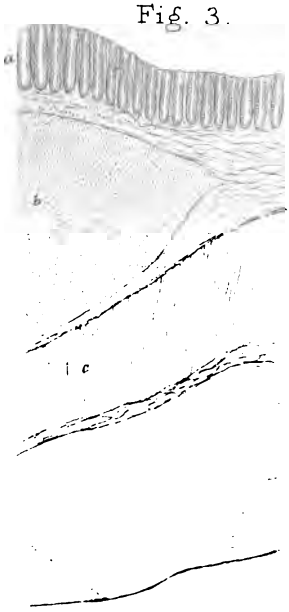
Healthy Section of rectal wall (Rabbit)

Fig. 2.



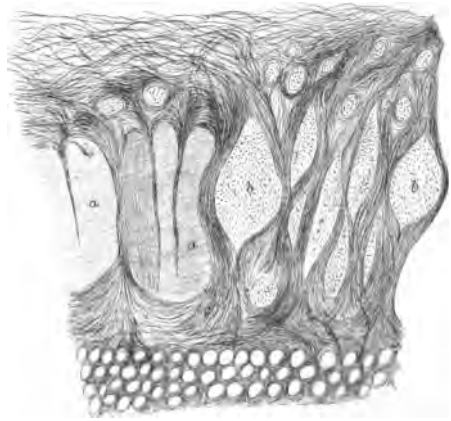
Healthy Section of rectal wall (Human.)

Fig. 3.

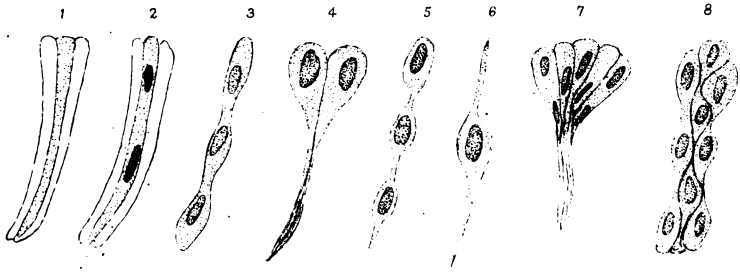


Growth (b) extending between muscular (c) & mucous (a) coats

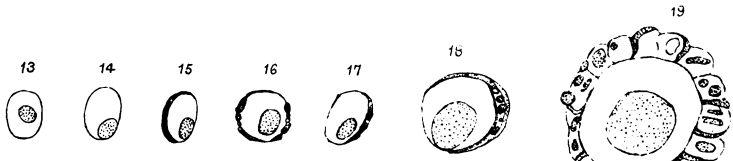
Fig. 4.



Section of muscular coat, new growth (b b) taking place of muscular fibres (a.a.) Hypertrophied inter muscular bands (c.c)



Cells from the surface of tumor



Cells from deeper portions of growth.

Sections of [illegible]

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PLATE III.

Fig. 1.

Pigmented nuclei continuous with lymphoid cells.

Fig. 2.

Villous projection shewing secondary offshoots commencing at a. a.

Fig. 3.

Section of mucous & submucous tissue shewing hypertrophied follicles

PLATE IV.

Fig. 1.

Cavities near surface becoming gradually filled with gland tissue.

Fig. 2.

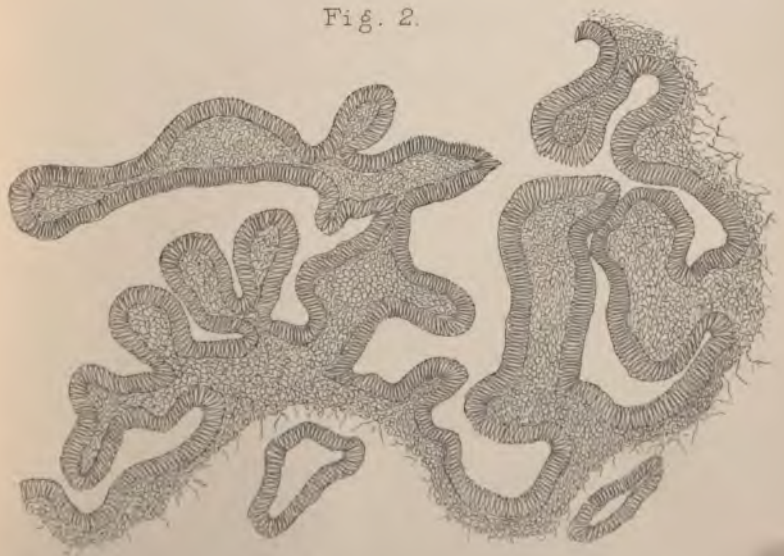
Shewing hyperniform arrangement of epithelium upon central stalks of retiform tissue.

PLATE V

Fig. 1.

From surface of tumor showing the method by which the Cavities lined by epithelium are formed.

Fig. 2.



Another specimen showing a similar process.

PLATE V.

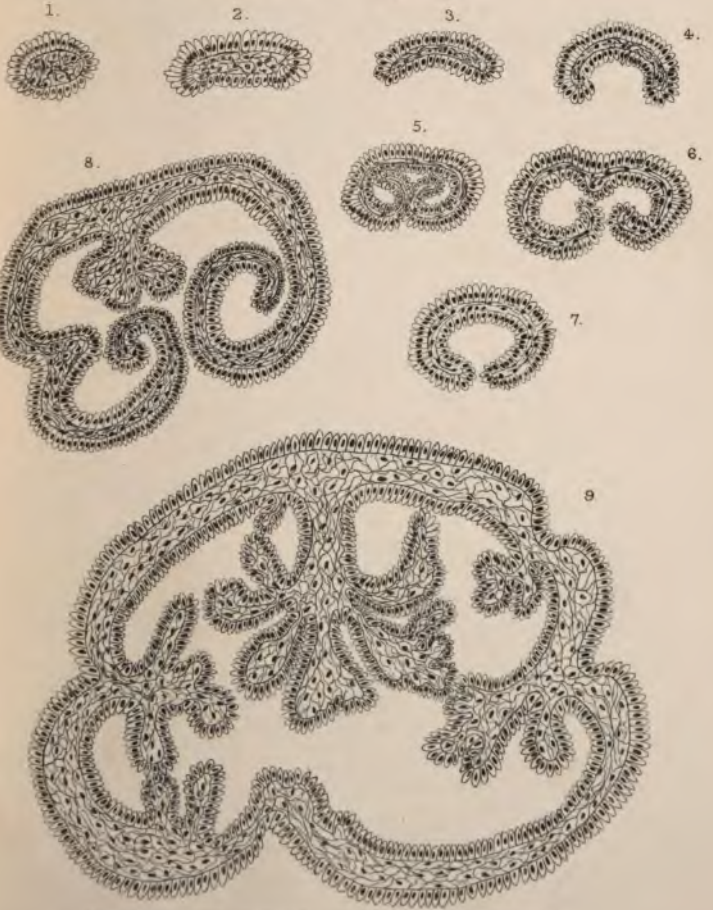
Fig. 1.

Section through Fat close to the growth, shewing the infiltration of cells into fatty tissue.

Fig. 2.

Surface of growing tumor seen by a 1 inch power with

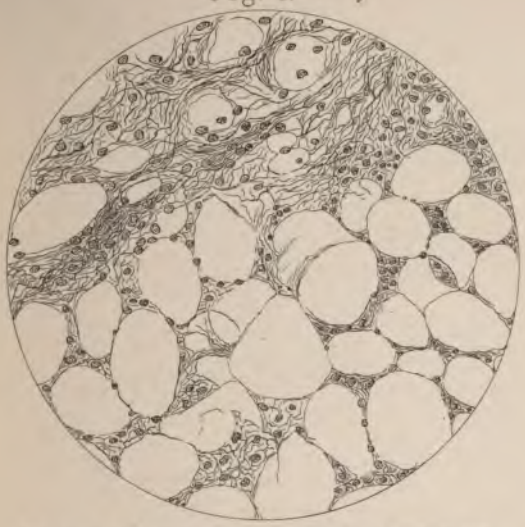
Formation of secondary projections.



Formations of enclosed cavities by bending in of the borders (diagramatic)

PLATE VIII.

Fig. 1.



Fat cells near margin of the tumor. Between the Fat cells there is an infiltration of small lymphoid looking cells.

Fig. 2.

Different portion from same specimen, the lymphoid cells having a distinctly epithelial character. In places the cavities of the original fat cells remain, in others they have become obliterated.

PLATE IX.

Fig. 1.

Section from very chronic growth showing well marked glandular Formation, the Acini being lined with perfect cylindrical epithelium.

Fig. 2.

Very rapid growth showing ill marked Acini, lined with imperfectly formed epithelium.

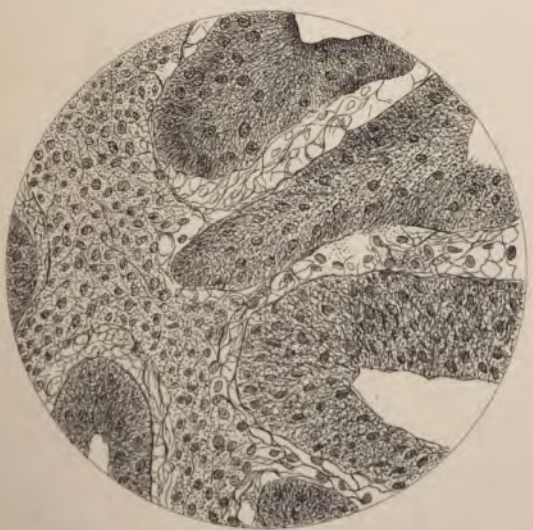
A. Grippe del. Minterra Bros sc. Hartnack N° 1

PLATE X.

Fig. 1.

From adenoid growth of 18 months duration.

Fig. 2.



Recurrent growth of 7 weeks duration.
Same Specimen as Fig 2. Plate IX.

PLATE XI

Fig. 1.

Section of well marked follicle in new growth.

Fig. 2.

Section of hypertrophied follicles in the immediate neighbourhood of the advancing disease.